This geologic map was funded in part by the USGS National Cooperative Geologic Mapping Program

Herschel T. Vinyard Jr.
Secretary

OPEN-FILE MAP SERIES 106, Plate 1

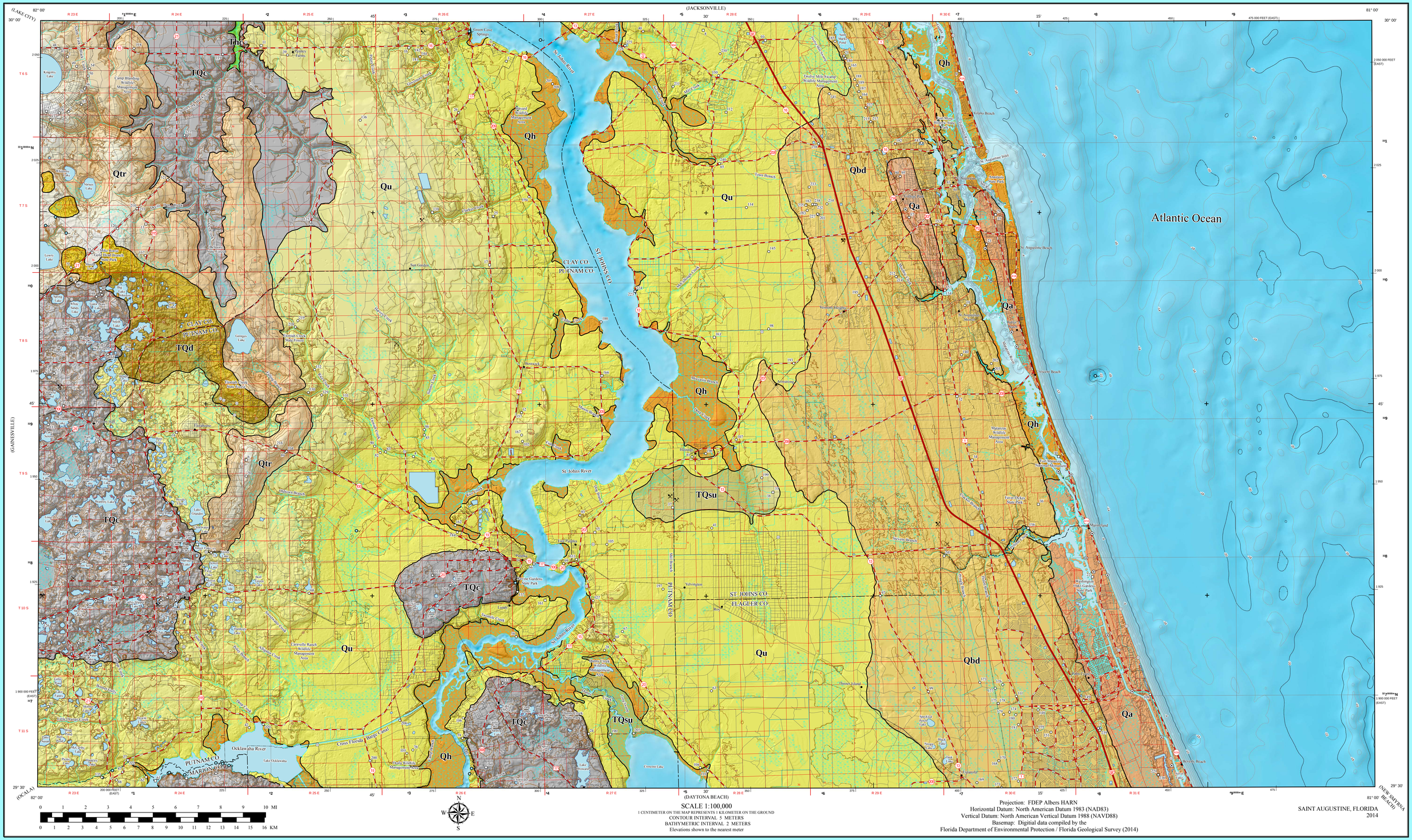
GEOLOGIC MAP OF THE USGS SAINT AUGUSTINE 30 X 60 MINUTE QUADRANGLE, NORTHEAST FLORIDA

2014

BY

RICHARD C. GREEN, CHRISTOPHER P. WILLIAMS, KENNETH M. CAMPBELL, PHILIP W. BAMBACH, LEVI M. HANNON, SETH W. BASSETT, WILLIAM L. EVANS III, DAVID T. PAUL AND BRIANNE APOLINAR

Jonathan D. Arthur
State Geologist and Director



SCALE 1:100,000

1 CENTIMETER ON THE MAP REPRESENTS 1 KILOMETER ON THE GROUND
CONTOUR INTERVAL 5 METERS
BATHYMETRIC INTERVAL 2 METERS
Elevations shown to the nearest meter

Projection: FDEP Albers HARN
Horizontal Datum: North American Datum 1983 (NAD83)
Vertical Datum: North American Vertical Datum 1988 (NAVD88)
Basemap: Digitial data compiled by the
Florida Department of Environmental Protection / Florida Geological Survey (2014)

SAINT AUGUSTINE, FLORIDA
2014

Holocene Sediments

Qh Sediments mapped as Holocene (Qh) may include quartz sands, marls, organics, humate and minor carbonate sands and mud. They may also include fresh-water molluscs. Within the study area, they occur as modern barrier islands and floodplain deposits in the vicinity of Crescent Lake, the St. Johns and Ocklawaha Rivers and along the east coast.

Quaternary Beach Ridge and Dune

Qbd Quaternary beach ridge and dune sediments (Qbd) are a subdivision of the undifferentiated Quaternary sediments that are noted on the basis of surficial expression of relict beach ridges and dunes. While not a formally recognized lithostratigraphic unit, Qbd are mapped in order to facilitate a better understanding of Florida's geology. Beach ridge and dune sediments are dominantly siliciclastic sands and are unconsolidated to poorly consolidated. Organics typically occur as disseminated organic matrix, roots and plant debris, carbonized remains or charcoal.

Quaternary Sediments

Qu While not a formally recognized lithostratigraphic unit Undifferentiated Quaternary (Qu) sediments are mapped in order to facilitate a better understanding of Florida's geology. Generally, Qu consists of white to gray to orange to blue-green, fine- to coarse-grained, clean to clayey unfossiliferous sands, sandy clays and clays with variable admixtures of organics.

Anastasia Formation

Qa The Anastasia Formation (Qa) is present within the Atlantic Coastal Ridge in a narrow band along the eastern edge of the study area. The formation is composed of interbedded coquina and quartz sands. The unit typically occurs as an orangish-brown to very pale orange, unconsolidated to moderately indurated coquina of whole and broken mollusc shells in a quartz sand matrix. The coquinas are commonly cemented by sparry calcite. The sands occur as light gray to tan and orangish-brown, unconsolidated to moderately indurated, unfossiliferous to very fossiliferous beds.

Trail Ridge Sands

Qtr Sediments mapped as Quaternary Trail Ridge Sands (Qtr) include heavy-mineral bearing sediments associated with Trail Ridge, but are not limited to just the ridge itself. They also include sediments of the Baywood Promontory of Pirkle et al., (1970)*. While not a formally recognized lithostratigraphic unit, they are mapped following the convention of Scott et al., (2001)* in order to facilitate a better understanding of Florida's geology. These sediments consist of unconsolidated to slightly indurated white to tan, medium to fine quartz beach ridge sands. They contain an average of three percent heavy minerals in some areas, of which approximately 45 percent are titanium-rich minerals consisting of ilmenite, luecoxene, and rutile. Other common heavy minerals in the unit include staurolite, zircon, kyanite, sillimanite, corundum, topaz, and tourmaline.

Tertiary/Quaternary Dunes

TQd Tertiary/Quaternary dune sediments (TQd), while not a formally recognized lithostratigraphic unit, are mapped in order to facilitate a better understanding of Florida's geology. Where LiDAR is available these dunes are readily differentiated from other units by their distinct topographic expression. These dune sediments are fine to medium quartz sand with varying amounts of disseminated organic matter. They are generally found at elevations above 100 feet (30.5 meters) MSL, although there are areas along the flanks of the Trail Ridge where elevations of these dune sands can be lower. Sands forming these dunes are thought to be derived from re-working of sediments from the Cypresshead Formation (TQc) and undifferentiated Quaternary sediments (Qu).

Undifferentiated Pliocene/Pleistocene Shelly Sediments

TQsu Undifferentiated Pliocene/Pleistocene shelly sediments (TQsu) consist of fine-to-medium quartz sand with variable amounts of calciluitic, shell and clay. Shells, which are often weathered, may vary from whole to fragments and may become the dominant lithology. Other accessory minerals may include calcite, aragonite, clay, mica, heavy minerals and minor phosphate. Colors range from light gray to light olive gray. While not a formally recognized lithostratigraphic unit, TQsu are mapped in order to facilitate a better understanding of Florida's geology.

Cypresshead Formation

TQc The Pliocene/Pleistocene Cypresshead Formation (TQc) is a mottled reddish-brown to reddish-orange to white, unconsolidated to poorly consolidated, fine to very coarse grained, variably clayey to clean quartz sand. Cross-beds are common within this formation. Discoid quartzite pebbles, mica, and ghosts of nearshore marine molluscs are often present. Cypresshead Formation sediments are present throughout much of the study area and form the core of the various ridges present in the region (see OFMS106 Plate 3 for more discussion). East of the St. Johns River, these sediments typically become a more weathered, finer-grained, well-sorted sand and silt. In cores, the unit is often characterized by beds of fine-grained, well sorted sand with thin layers of clay dispersed through the sand.

Coosawhatchie Formation (Hawthorn Group)

Thc The Miocene Coosawhatchie Formation (Thc) consists of quartz sands, dolostones and clays. The unit ranges in color from greenish-gray and light gray to olive gray. The most common lithology in the upper section of the unit is characteristically a sandy to very sandy dolostone which may be interbedded with quartz sands and clays. Quartz sands and clays dominate and dolostones become subordinate in the lower portion of the section. The quartz sands are generally phosphatic, clayey and dolomitic. Sand grains are fine to medium grained and poorly to moderately sorted. In many instances, the sands grade into dolostones and clays. Clay content is variable and may range from five to more than 30 percent. Phosphate content is highly variable, ranging from a trace to more than 20 percent. Coarse phosphate sands and pebbles are present but not common.

LEGEND

- Primary highway
- Secondary highway
- Light duty road, principal street
- Railroad
- County boundary
- National or state reservation boundary
- Contours — Index / Intermediate
- Bathymetry Contours — Index / Intermediate
- River or stream
- Lake or pond
- Wetland
- U.S. Public Lands Survey Township/Range
- U.S. Public Lands Survey Section
- 7.5 Minute quadrangle tick marks
- Core
- Cuttings
- Archived M-Series sample
- Outcrop / exposure
- Quarry
- Borrow pit
- Spring
- City/town

* Wells numbered 1 - 38 are used in cross-sections on OFMS 106, Plate 2
* Refer to Open-File Report 102, Appendix A for well information

*Note: See OFR 102 for references

Basemap Coordinate Explanation

10,000-meter grid, zone 17 North Universal Transverse Mercator
25,000-foot grid ticks based on Florida coordinate system, east and north zones
*0 = +0000E
1 350 = 1 350 000 FEET (EAST)

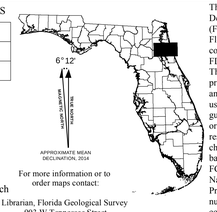
1:24,000 QUADRANGLE GRID

KINGSLEY	PENNEY FARMS	GREEN COVE SPRINGS	PICOLATA	BAKERSVILLE	SAINT AUGUSTINE	
GOLD HEAD BRANCH	RICE CREEK	BUSTWICK	RIVERDALE	ELKTON	SAINT AUGUSTINE BEACH	SAINT AUGUSTINE BEACH SE
PUTNAM HALL	BAYWOOD	PALATKA	HASTINGS	SPUDS	DINNER ISLAND NE	MATANZAS INLET
KEUKA	ROBMAN	SATSUMA	SAN MATEO	DINNER ISLAND	ESPANOLA	BEVERLY BEACH

ADJOINING MAPS

1	2	3
4		6
7	8	9

1 Lake City
2 Jacksonville
3
4 Gainesville
5 Saint Augustine
6
7 Ocala
8 Daytona Beach
9 New Smyrna Beach



For more information or to order maps contact:

Librarian, Florida Geological Survey
903 W Tennessee Street
Tallahassee, FL 32304-7716
850/617-0316
http://www.dep.state.fl.us/geology/programs/statemap.htm

This map was created using Florida Department of Environmental Protection (FDEP) databases and data obtained by the Florida Geological Survey (FGS). It was completed August 31, 2014, by the FDEP/FGS, Geological Investigations Section. This document was prepared for the presentation of the geologic information shown and is not intended to replace site-specific or use-specific investigations. The FGS does not guarantee this document to be free from errors or inaccuracies and disclaims any responsibility or liability for inappropriate change of scale, interpretations, or decisions based thereon. Cooperatively funded by the FGS and the U.S. Geological Survey (USGS), National Cooperative Geologic Mapping Program, under USGS assurance award number G13AC00318. The views and conclusions in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S.

ISSN 1934-1830