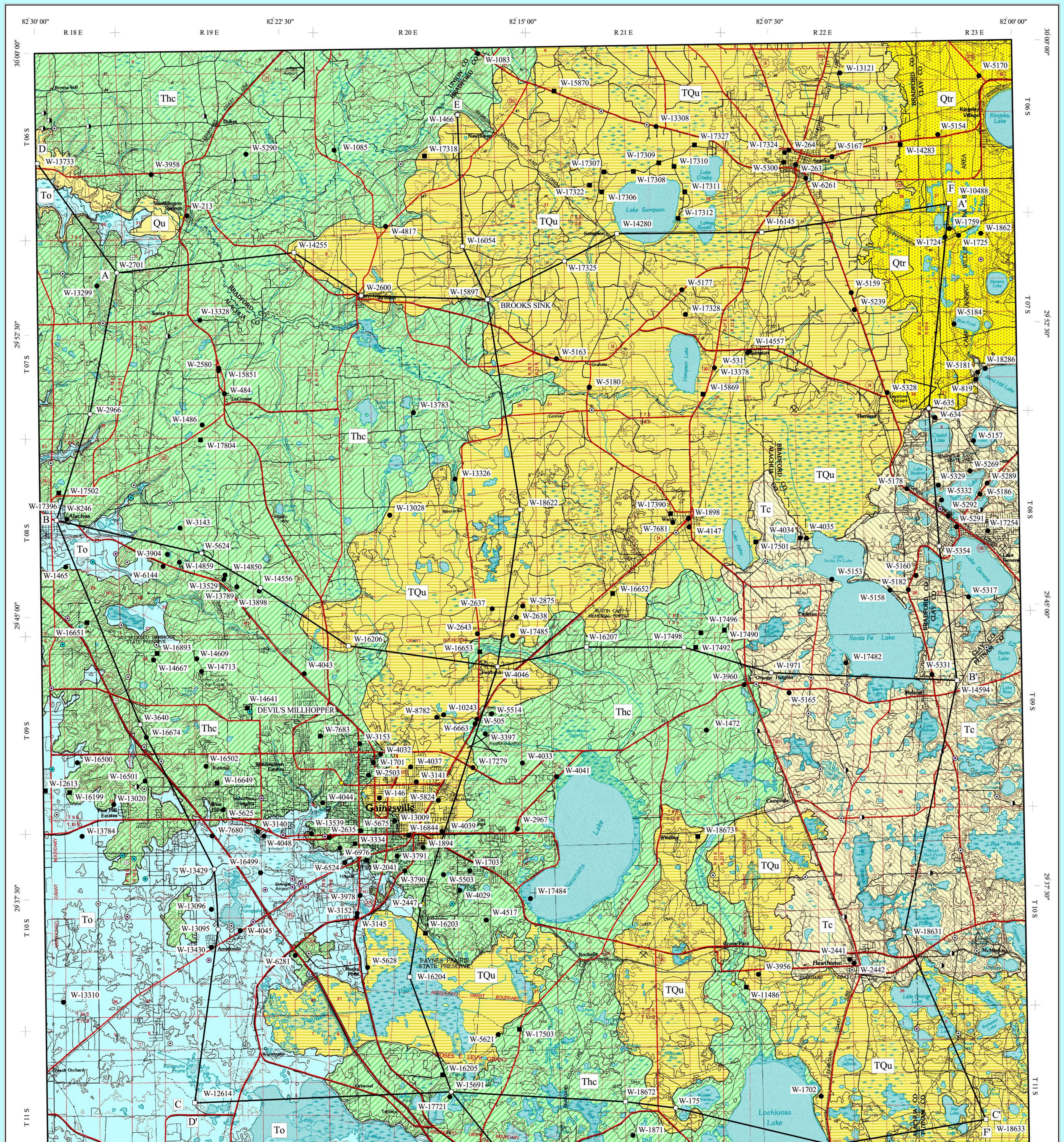

OPEN FILE MAP SERIES NO. 94-01

GEOLOGIC MAP OF THE EASTERN PORTION OF THE U.S.G.S. 1:100,000 SCALE GAINESVILLE QUADRANGLE, NORTHERN FLORIDA

2005

BY

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LEGEND FOR GEOLOGIC MAP

Quaternary

Pleistocene/Holocene

Qu — **Undifferentiated Quaternary Sediments**

Light brown to tan, medium to fine quartz sand with variable admixtures of clay and organics, unconsolidated to poorly indurated. This unit may contain significant amounts of clay and organics.

Pleistocene

Qtr — **Trail Ridge Sands**

The Trail Ridge sands consist of white to tan, medium to fine quartz beach ridge sands, unconsolidated to slightly indurated. They contain an average of 3 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 include staurolite, zircon, kyanite, sillimanite, corundum, topaz, and tourmaline.

Tertiary/Quaternary

Pliocene/Pleistocene

TQu — **Undifferentiated Tertiary/Quaternary Sediments**

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. Undifferentiated Tertiary/Quaternary sediments are siliciclastics that are separated from the Undifferentiated Quaternary Sediments solely on the basis of elevation (Scott, 2001). Pleistocene sea levels reached a maximum of approximately 100 feet (30.5 meters) above MSL (Colquhoun, 1969). These sediments are predominantly older than Pleistocene but include sediments reworked during the Pleistocene. This unit may include fluvial and aeolian deposits.

Tertiary

Pliocene

Tc — **Cypresshead Formation**

The Cypresshead Formation 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-bedded sands are common within this formation. Discoid quartzite pebbles, mica, and ghosts of nearshore mollusks are often present.

Miocene

Hawthorn Group

Thc — **Coosawhatchie Formation**

The Coosawhatchie Formation consists of gray to bluish-gray sandy clay or clayey sand with phosphate grains, and limestone to dolostone. Lenses of relatively pure quartz sands, clays, or carbonate are uncommon. This unit is lithologically variable and units may pinch out and interfinger both laterally and vertically. Outcrops of Coosawhatchie Formation in the study area are typically very weathered and the lithology consists of reddish-brown to white, clayey, calcareous quartz sands to sandy clays with leached phosphate grains and limonitic and calcareous pebbles.

Eocene

To — **Ocala Limestone**

White to cream-colored, fine to coarse grained, poorly to well indurated, poorly to well sorted, fossiliferous limestone (wackestone, packstone, and grainstone); may also include chert nodules. Lower Ocala may be dolomitized. Fossils include the foraminifera *Lepidocyclina sp.*, and *Heterostegina ocalana*, miliolids, bryozoans, mollusks, echinoids, crabs, and algae.

This map was created using FDEP databases and data obtained from the Florida Geological Survey. It was completed October 30, 2005, by the Florida Department of Environmental Protection, Division of Resource Assessment & Management, Florida Geological Survey, 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 Florida Geological Survey does not guarantee this document to be free from errors or inaccuracies and disclaims any responsibility or liablility for inappropriate change of scale or interpretations or decisions based thereon. Cooperatively funded by the Florida Geological Survey and the U.S. Geological Survey, National Cooperative Geologic Mapping Program, under U.S.G.S. assistance award number 04-HQ-PA-0003. 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. Government.

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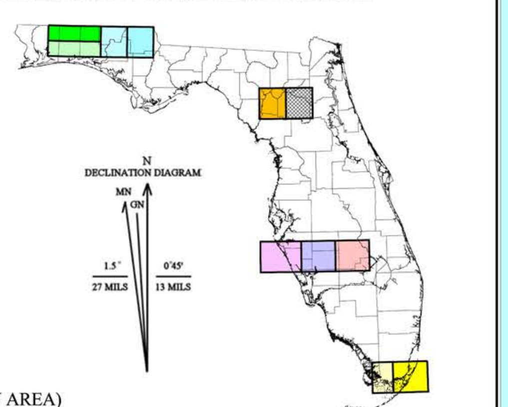
Projection: FDEP Albers HARN North American Datum 1983 (NAD83)

Basemap: Georeferenced TIF of U.S.G.S. 1:100,000-scale metric topographic map of Gainesville, Florida

FLORIDA GEOLOGICAL SURVEY OPEN-FILE MAP SERIES (O.F.M.S.) PRODUCED UNDER THE STATEMAP PROGRAM



- O.F.M.S. 83/01-07
- O.F.M.S. 83/08-12
- O.F.M.S. 86
- O.F.M.S. 87
- O.F.M.S. 88
- O.F.M.S. 89
- O.F.M.S. 90
- O.F.M.S. 91
- O.F.M.S. 92
- O.F.M.S. 93
- O.F.M.S. 94 (CURRENT STUDY AREA)

- 75 Interstate
- 441 / 24 Primary / Secondary road
- Local road
- Railroad
- County Boundary
- Power Transmission Line
- State Park or Recreation Area
- Contours: 5 Meter Interval
  - Index
  - Intermediate
- River or Stream
- Lake or Pond
- Wetland
- U.S. Public Lands Survey
- Quarry or Pit
- Swallet
- Sinkhole
- First Magnitude Spring
- Second, Third or Fourth Magnitude Spring
- Outcrop
- Archived M-Series Sample
- Float
- Core
- Cross-section Core
- Cuttings
- Cross-section Cuttings
- Cross-section Line

1 0 1 2 3 4 5 Miles

1 0 1 2 3 4 5 6 7 8 9 10 Kilometers

Geologic Discussion

The near surface geology of the eastern portion of the U.S.G.S. 1:100,000 scale Gainesville quadrangle is composed of a complex sequence of carbonate and siliciclastic sediments ranging from Eocene to Holocene in age. A combination of factors, including fluvio-deltaic deposition, marine deposition, dissolution of underlying carbonates, erosion of sediments as a result of eustatic changes in sea level, and structural features, have influenced the geology of the area.

Numerous karst features are present in the area. Just west of the study area, the Suwannee River and Santa Fe River basins and their tributaries contain at least 55 documented springs, including 9 first magnitude springs (defined as having a minimum average flow of 100 cubic feet per second, or 64.6 million gallons per day). Many of these springs have shown significant increases in pollutants, particularly nitrate, in the last few decades (Jones et al., 1998; Champion and Dewitt, 2000; Scott et al., 2004; Means and Scott, 2003). The recharge areas for many of these springs are believed to be located in the area. Of particular concern are the locations of numerous swallets in the area. A swallet is defined as a place where surface water disappears underground in a limestone region (Copeland, 2003). These karst features are of importance because the surface water they receive flows directly into the Floridan Aquifer System without being filtered by overlying sediments. In urbanized and agricultural areas, where surface waters often contain pollutants, they recharge our aquifer systems and may ultimately discharge from springs.

The majority of the swallets occur in areas near the Cody Escarpment where clayey sediments that protect the aquifer have been removed by erosion (Means and Scott, 2005). In the map area, the southern portion of the Cody Escarpment is located along the western boundary of the Alachua Karst Hills extending southward to the eastern, southern, and southwestern boundary of the Hawthorne Lakes Region (Scott, in preparation) or the southeastern and southern boundary of the Northern Highlands (Puri and Vernon, 1964; White, 1970). The Florida Geological Survey, funded through the Florida Springs Initiative, is currently conducting a survey of swallets in and around the region. STATEMAP personnel are assisting in this project within the study area. To date 19 swallets have been located and catalogued in the map area. Detailed geologic mapping of lithostratigraphic units in this area provides critical data needed to help in future assessments of the vulnerability of the aquifer systems to contamination in areas of swallet influence as well as determining where limestone is at or near land surface.

Several structural, sedimentological and geomorphic variables have affected the geology of the region. The Peninsular Arch, a structurally high area which affected deposition from the early Cenozoic through the Oligocene (Williams et al., 1977; Miller, 1986; Randazzo and Jones, 1997) is the dominant subsurface feature in the Florida peninsula (Applin, 1951). The axis of the Peninsular Arch extends from southeastern Georgia to the vicinity of Lake Okeechobee in southern Florida following a general northwest to southeast trend. The crest of the arch passes beneath Alachua County within the study area and is highest just north of Alachua County in Union and Baker Counties. The arch was a topographic high during most of the Cretaceous Period and had Upper Cretaceous sediments deposited over it (Applin, 1951). It formed a relatively stable base for Paleogene carbonate deposition except during times of periodic land emergence due to lowered sea levels (Williams et al., 1977). The arch did not affect Neogene to Holocene sediment deposition (Williams et al., 1977).

The Ocala Platform is the most prominent structure affecting the near surface depositional and post-depositional environments within the area. The map area is on the northeastern flank of the Ocala Platform (Williams et al., 1977) where the Ocala Limestone is at or near land surface. Hopkins (1920) originally named this feature the Ocala Uplift. Vernon (1951) described the Ocala Uplift as a gentle flexure developed in Tertiary sediments with a northwest-southeast trending crest. Because there is continuing uncertainty about the origin of this feature, Scott (1988) used the term Ocala Platform, rather than Ocala Uplift, since it does not have a structural connotation.

The Ocala Platform exerted its influence on Neogene sediment deposition, and Miocene sediments of the Hawthorn Group are thought to have been deposited across the platform (Scott, 1988). Post-Miocene erosion, however, has removed sediments of the Hawthorn Group from much of the crest of the Ocala Platform, exposing Eocene and Oligocene carbonates (Cooke, 1945; Pirkle, 1956b; Espenshade and Spencer, 1963; Brooks, 1966; Scott, 1988). Undifferentiated sediments have subsequently been deposited on the exposed Eocene carbonates. These consist of residual clays, sands, and eolian sands deposited during the Pliocene to Holocene (Randazzo and Jones, 1997).

Vernon (1951) utilizing aerial photographs, first mapped fracture patterns throughout northern peninsular Florida. Regionally, these fractures generally trend parallel to the axis of the Ocala Platform in a northwest-southeast orientation. A secondary system of fractures intersects these primary fractures at about 90 degree angles in generally a northeast-southwest trend (Vernon, 1951). Orientation of stream meanders along the Suwannee and Santa Fe Rivers demonstrates that these fracture patterns may be a controlling factor in stream location. Lakes, sinkholes and other karst features also appear to be forming more commonly along these fracture trends (Williams et al., 1977).

Several relict Neogene and Quarternary coastal terraces, which developed as a result of fluctuating sea levels, have been documented in the study area. Healy (1975) recognized four marine terraces within the study area: the Wicomico terrace at elevations of 70 to 100 feet (21.3 to 30.5 meters) above mean sea level (MSL), the Sunderland (Cooke, 1939) or Okeefenokee terrace (MacNeil, 1950) at elevations between 100 and 170 feet (30.5 and 51.8 meters) above MSL, the Coharie terrace at elevations between 170 and 215 feet (51.8 and 65.5 meters) above MSL, and the Hazlehurst terrace, formerly referred to as the Brandywine terrace (Cooke, 1939); the Coastwise delta plain (Vernon, 1942); and the Pliocene terrace (MacNeil, 1950) with elevations between 215 and 320 feet (51.8 to 97.5 meters) above MSL. Detailed discussions and correlations of these marine terraces and relict shorelines have been attempted by many authors, including Matson and Sanford (1913), Cooke (1931, 1939), Flint (1940, 1971), MacNeil (1950), Alt and Brooks (1965), Pirkle et al. (1970), and Healy (1975).

According to Scott (in preparation), the study area falls within four geomorphic districts: the Ocala Karst District, the Okeefenokee Basin District, the Central Lakes District and the Barrier Island Sequence District. The study area has been subdivided topographically into five regional physiographic units (Scott, in preparation): the Williston Karst Plain and Alachua Karst Hills of the Ocala Karst District, the Southern Okeefenokee Basin in the Okeefenokee Basin District, the Hawthorne Lakes Region in the Central Lakes District and Trail Ridge in the Barrier Island Sequence (See Plate 2, Figure 1 for discussion of these five units).

The Ocala Karst District is dominated by dissolution sinkholes producing a rolling topography. Generally, these areas have a thin permeable siliciclastic cover where downward percolating groundwater slowly dissolves the underlying limestone, leading to cover-collapse sinkholes and cover-subsidence features. Cover-collapse sinkholes form rather abruptly from the structural failure of a cavern roof. An excellent example of this is Devil's Millhopper, located in Alachua County in northern Gainesville.

Cover subsidence features generally occur in areas where the overlying siliciclastics are thicker and the sediments sag as the carbonates dissolve underneath. Typically, areas such as these have only a few shallow sinks formed by the downward movement of the siliciclastic overburden filling voids created by the slow dissolution of the underlying carbonates. Springs, sinking and resurgent streams, and caverns commonly occur within the Ocala Karst District.

The Okeefenokee Basin District is an area of low relief. Elevations, which decrease from the northwest to the southeast, range from 240 feet (73.2 meters) to 75 feet (22.9 meters) above MSL. The Basin, which has numerous swampy areas, is formed on Plio-Pleistocene sediments. The Okeefenokee Swamp, which occupies much of the Basin north of the study area, forms the headwaters of the Suwannee River and the St. Mary's River.

The Central Lakes District occupies most of the Central Highlands of Cooke (1939) in peninsular Florida. The district extends from eastern Alachua County, southeastern Bradford County and southern Clay County to southernmost Highlands County. The Central Lakes District lies east and south of the Ocala Karst District, west of the Barrier Island Sequence Disrtict and south of the Okeefenokee Basin District in the map area. A thick sequence (up to 200 feet [61 meters]) of siliciclastic and carbonate sediments of the Hawthorn Group, siliciclastics of the Cypresshead Formation, and undifferentiated sediments overlie the Ocala Limestone in the district. Dissolution of the limestone and subsequent subsidence or collapse has created the characteristic sinkhole lakes and dry sinks which dominate the landscape. Elevations in the district range from 50 to 60 feet (15.2 to 18.3 meters) in depressions and valleys, to more than 300 feet (91.4 meters) on the highest hills.

The Barrier Island Sequence District extends into Florida from Georgia and is characterized by beach ridges, dunes and paleo-lagoons. In Florida, the district extends from the Georgia-Florida state line southward to the vicinity of Lake Okeechobee. It lies to the east of the Okeefenokee Basin District, the Ocala Karst District, the Central Lakes District, and the Sarasota River District. It lies north of the eastern portion of the Everglades District. In the study area, the surficial and shallow subsurface sediments of the district were deposited during the Plio-Pleistocene and lie unconformably on sediments ranging from the Upper Eocene Ocala Limestone to the Oligocene-Miocene Hawthorn Group. Elevations, which range from sea level east of the area to more than 250 feet (76.2 meters) above MSL on Trail Ridge, slowly decrease to the south.

The Cody Escarpment is a regionally outfacing scarp which is present in the Eastern Gulf and Atlantic Coastal Plains (Doering, 1960) and occurs along the western boundary of the Alachua Karst Hills (roughly along Interstate 75 in the northern and central part of the map area) extends southward along the boundary between the Southern Okeefenokee Basin District and Hawthorne Lakes Region, where it ends along the southeastern boundary of Trail Ridge. The scarp, which is the most persistent topographic break in Florida, is unbroken except by the valleys of major streams. It's definition, however, is variable (See Puri and Vernon, 1964 for additional discussion). Due to major differences in elevation and orientation, this escarpment was probably formed under different sea-level conditions (Scott, personal communication).

The map area is blanketed by a veneer of Tertiary and Quaternary sediments and soils. For this reason, and in keeping with geologic mapping practices developed by Scott et al. (2001), the authors have adopted the policy of mapping the first named geologic unit within 20 feet (6.1 meters) of the surface. If undifferentiated Tertiary/Quaternary (TQu) sediments attain a thickness greater than 20 feet (6.1 meters), then they appear as the mapped unit. If the Tertiary/Quaternary sediments are less than 20 feet (6.1 meters) thick, then the underlying stratigraphic unit appears on the map.

The Eocene to Miocene units exposed in the map area have regional stratigraphic significance, and have been identified, correlated, and interpreted in many different ways in the literature. Some previous investigators relied heavily on fossils to establish formations and correlate facies within this region, a practice which has led to some confusion regarding litho-stratigraphy. Summaries of previous work on units in this area can be found in Vernon (1951), Vernon and Puri (1956), Puri et al. (1967), Scott (2001), and Evans et al. (2004). The Upper Eocene Ocala Limestone (To), first described by Dall and Harris (1892), is a biogenic marine limestone comprised largely of foraminifera, mollusks, echinoids and bryozoans. Based on lithologic differences, it can be informally subdivided into an upper and lower unit (Scott et al., 1991). This subdivision, while often apparent in cores and quarries, is difficult to ascertain in cuttings. As a consequence of this, the geologic cross-sections do not break out the upper and lower Ocala Limestone.

The upper unit is typically white to cream, fine to coarse grained, poorly to well indurated, poorly to well sorted, very fossiliferous limestone (wackestone, packstone, and grainstone). Fossils commonly include large foraminifers, bryozoans, mollusks, and a rich diversity of echinoids. The lower unit is typically a white to cream, fine to medium grained, poorly to moderately indurated, moderately to well sorted, limestone (grainstone to packstone). The lower unit may be partially dolomitized. Fossils include miliolids, smaller foraminifera, bryozoans, algae, mollusks, and echinoids.

Portions of the upper Ocala Limestone have been locally replaced by silica and upon erosion, large boulders may remain as residual float. Chert is often seen in fractures and joints in caves and within quarries. The most likely source of silica is from weathering of the Hawthorn Group sediments (Williams et al., 1977; Scott, 1988). There are several processes that have occurred, or are occurring, in the Hawthorn Group which release silica in solution and provide a source for silica in the replacement of carbonate rocks (Altshuler et al., 1963; Mitchell, 1965; Assefa, 1969; Scott, 1988). The occurrence of this float throughout portions of the map area is an indication that the Hawthorn Group once covered much more of the map area and has been subsequently removed by erosion and weathering (Scott, 1988).

The top of the Ocala Limestone ranges from 95 feet (29.0 meters) below MSL in W-1466 (cross section E-E'), to 75 feet (22.9 meters) above MSL in W-4046 (cross section E-E'). The majority of the wells used in the cross section did not penetrate the entire thickness of the Ocala Limestone. Where deep wells were used such as W-13429 and W-13095 (cross-section D-D') it was difficult to ascertain the contact between the Ocala Limestone and the underlying Avon Park Formation due to the intense dolomitization in both units. In well W-18536, just west of the northwestern portion of the study area, the Ocala has a thickness of 250 feet (76.2 meters) in well W-3640 to 280 feet (85.3 meters) in well W-2447 (see cross-sections C-C' and D-D' in Evans et al., 2004). The Ocala Limestone unconformably overlies the Avon Park Formation and is unconformably overlain by sediments of the Hawthorn Group (Th). The upper surface of the Ocala Limestone is heavily karstified and well W-17396 in geologic cross sections B-B' and D-D' is believed to have been drilled into a karst feature.

Due to erosion and dissolution, the Oligocene Suwannee Limestone (Ts) is not found in place within the map area. Silicified, residual boulders of the Suwannee Limestone, however, are commonly found in the area north of the Santa Fe River west of the study area (Evans et al., 2004) indicating that it once covered much of the northeastern portion of the map area. These float boulders contain numerous molds of the echinoid *Ryncholampus gouldii,* an index fossil for the Suwannee Limestone. It is possible that erosionally isolated remnants of the Suwannee Limestone may occur in the northeastern portion of the study area; however, none were encountered during this field investigation. Williams et al. (1977) and Clarke et al. (1964) report that the Suwannee Limestone is in the subsurface in northwestern Alachua County extending northward into Columbia, Bradford and Union Counties. The Suwannee Limestone was not recognized in wells from the area during this study.

The Miocene Hawthorn Group is composed of a number of different formations and members. In the study area, sediments of the Coosawhatchie Formation of the Hawthorn Group (Thc) are present near the surface and consist of gray to bluish-gray sandy clay or clayey sand with phosphate grains, and limestone to dolostone. Lenses of relatively pure quartz sands, clays, or carbonate are uncommon. This unit is lithologically variable and beds may pinch out and interfinger both laterally and vertically. Outcrops of Coosawhatchie Formation in the study area are typically very weathered and consist of reddish-brown to white, clayey, calcareous quartz sands to sandy clays with leached phosphate grains and limonitic and calcareous pebbles. Two other Hawthorn Group units encountered in the study area are, in ascending order, the Penney Farms and Marks Head Formations. While often apparent in cores, sinkholes and quarries, these units were difficult to ascertain in cuttings. As a consequence of this, the geologic cross-sections do not break out these formations. These formations have a complex series of interbedded phosphatic carbonates and siliciclastics. The reader is referred to Scott (1988) for a complete discussion of these units.

Hawthorn Group sediments unconformably overlie the Ocala Limestone and are unconformably overlain by the Cypresshead Formation in the eastern part of the map area, Undifferentiated Quaternary sediments (Qu) in the north and central portion of the study area, and Undifferentiated Tertiary/Quaternary sediments (TQu) in the northeastern and southeastern parts of the study area. In the southwestern part of the map area, Hawthorn Group sediments are missing due to erosion. Fossils in the Hawthorn Group are sparse but may include vertebrate remains, corals, and mollusks. Williams et al. (1977) reports that the most commonly found fossils are oysters and coral heads. Silicified coral heads have been observed in hill exposures and stream beds in northeastern Alachua County by numerous authors (Dall and Harris, 1892; Williams et al., 1977).

The top of the Hawthorn Group ranges from 35 feet (10.7 meters) above MSL in W-18633 (cross-section F-F') to 185 feet (53.4 meters) above MSL in W-3640 (D-D'). The Hawthorn Group ranges from less than 10 feet (3.1 meters) to 210 feet (64.0 meters) thick in well W-1466 (cross-section E-E').

The Cypresshead Formation (Tc) was originally named by Huddlestun (1988) and was extended into Florida by Scott (1988). It 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-bedded sands are common within this formation. Discoid quartzite pebbles, mica, and ghosts of nearshore mollusks are often present. It is at or near the surface in the eastern portion of the study area south of Trail Ridge. In general, the Cypresshead Formation is exposed at the surface above 100 feet (30.5 meters) above mean sea level (Scott, 2001). The Cypresshead Formation is a near shore, shallow marine deposit equivalent to the deltaic sediments of Citronelle Formation and the Miccosukee Formation prodeltaic sediments (Scott, 2001).

The top of the Cypresshead Formation ranges from 100 feet (30.5 meters) above MSL in W-18631 (cross-section F-F') to 175 feet (53.3 meters) in W-10488 (cross-sections A-A' and F-F'). Thickness ranges from 60 feet (18.3 meters) in W-18631 (cross-section F-F') to 100 feet (30.5 meters) in W-14594 (cross-section F-F'). The Cypresshead Formation is unconformably overlain by Trail Ridge sands, undifferentiated Tertiary/Quaternary sediments (TQu), and Quaternary sediments (Qu).

The Trail Ridge sands are a 130 mile (209 kilometer) long sand ridge which extends southward from the Altamaha River in southern Georgia to the southern parts of Clay and Bradford Counties in the northeast corner of the study area. The lithology consists of white to tan, unconsolidated to slightly indurated, medium to fine quartz beach ridge sands, containing an average of 3 percent heavy minerals in some areas. Crest elevations range from approximately 175 feet (53.3 meters) above MSL in W-635 (cross-section F-F') to 250 feet (76.2 meters) above MSL in W-10488 (cross-sections A-A' and F-F'). Thickness ranges from 20 feet (6.1 meters) in W-635 (cross-section F-F') to 60 feet (18.3 meters) in W-10488 (cross-section F-F').

The heavy mineral sands of Trail Ridge have been mined in northern Florida along the southern 18 mile (29 kilometers) stretch of Trail Ridge for many years (Garner, 1972). Approximately 45 percent of the heavy minernal sands are titanium-rich minerals consisting of ilmenite, luecoxene, and rutile. Other common heavy minerals include staurolite, zircon, kyanite, sillimanite, corundum, topaz and tourmaline (Pirkle et al., 1977).

The source of heavy mineral sands is from weathering and erosion of igneous and metamorphic rocks of the southern Appalachians (Gillson, 1959). Weathering and erosion of these source rocks provided the heavy mineral grains which were transported southward by fluvial and marine processes. It is hypothesized that the Trail Ridge ore sands accumulated as part of a beach ridge which was formed at the highstand of an eroding transgressive sea (Pirkle et al., 1977). The major source of sediments for Trail Ridge, and for the ore deposits, are believed to have been the sands of the Okeefenokee Basin District to the west of Trail Ridge (Scott, in preparation) (See Plate 2, Figure 1). This concept for the origin of Trail Ridge is consistent with heavy mineral suites and with the sedimentary and physiographic features of the region.

Undifferentiated Tertiary/Quaternary sediments (TQu) are siliciclastics that are separated from the undifferentiated Quaternary Sediments solely on the basis of elevation (Scott et al., 2001). Pleistocene sea levels reached a maximum of approximately 100 feet (30.5 meters) above MSL (Colquhoun, 1969). The sediments which occur above 100 feet (30 meters) MSL are predominately older than Pleistocene but may have been reworked during the Pleistocene. This unit may include fluvial and aeolian deposits and occurs in a band extending from the Georgia and Florida state boundary in Baker and Columbia Counties, southward into Alachua, Clay and Putnam Counties. These poorly consolidated to unconsolidated siliciclastics are 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 clay and organics.

Undifferentiated Quaternary sediments (Qu) lie unconformably on either the Eocene Ocala Limestone (To), the Coosawhatchie Formation of the Hawthorn Group (Thc), or undifferentiated Hawthorn Group sediments (Th) throughout the study area. These sediments, which generally consist of sandy clays and clayey sands and aeolian dune sands, often include weathered and silicified boulders of the Ocala Limestone.

SELECTED PHOTOGRAPHS FROM STUDY AREA

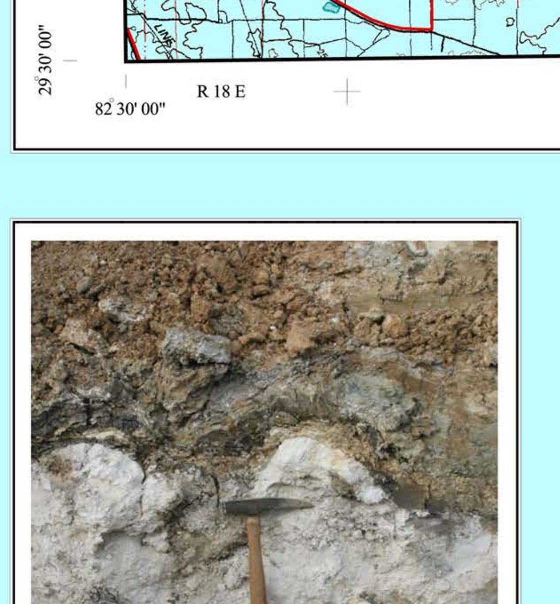


Photo 1. Contact of Ocala Limestone and Hawthorn Group sediments exposed during new construction. Site located at: T. 09 S, R. 18 E, S. 34, SW 1/4 of NE 1/4. Photo by Richard C. Green

Photo 2. Typical exposure of Ocala Limestone. Located at: T. 10 S, R. 18 E, S. 12, SE 1/4 of NE 1/4. Photo by Richard C. Green.

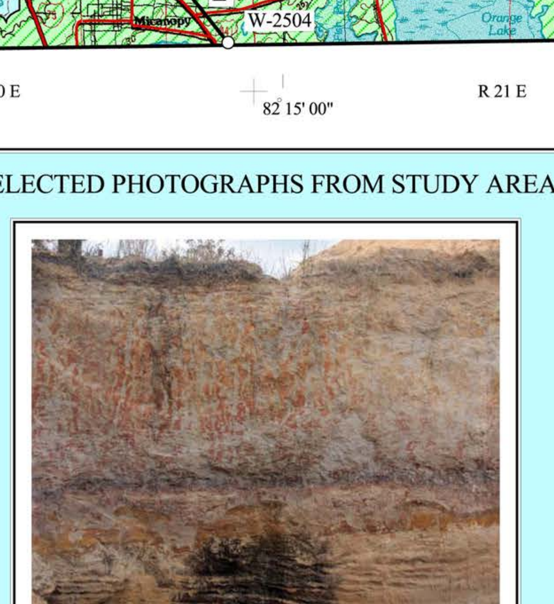


Photo 3. Cypresshead Formation exposed in borrow pit. Pit is located at: T. 08 S, R. 22 E, S. 25, NE 1/4 of SW 1/4. Photo by Richard C. Green

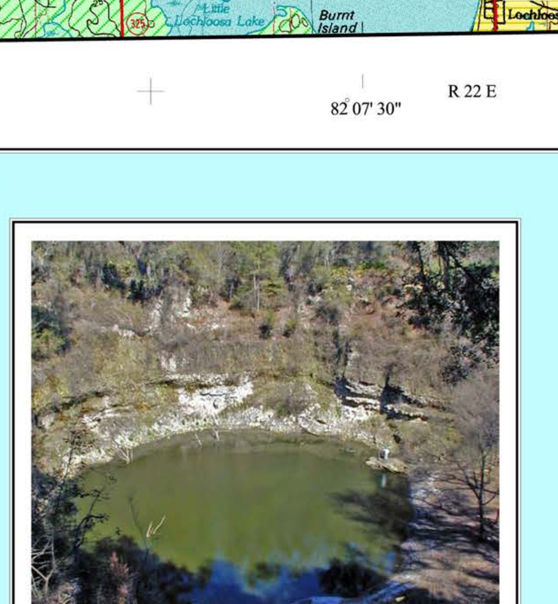


Photo 4. Brooks Sink exposure located at: T. 07 S, R. 20 E, S. 12, SW 1/4. Photo by Thomas M. Scott

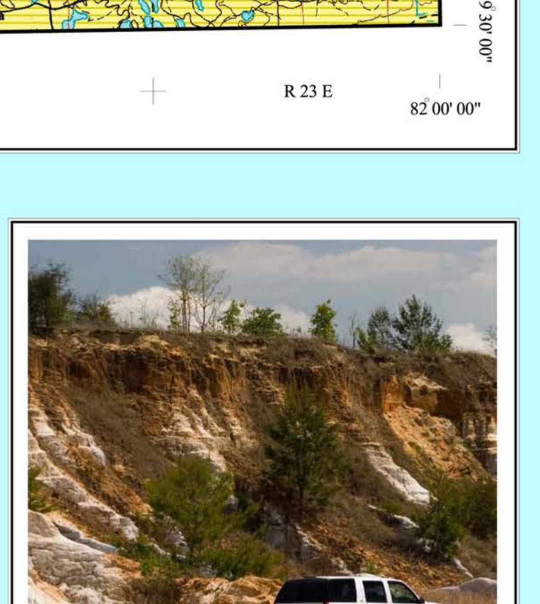


Photo 5. Exposure of Cypresshead Formation in Grandin Sand Mine. Mine located just east of study area at: T. 08 S, R. 23 E, S. 02, SW 1/4. Photo by Richard C. Green