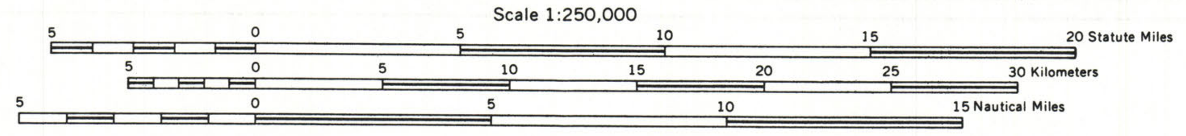
FLORIDA DEPARTMENT OF NATURAL RESOURCES
BUREAU OF GEOLOGY

Each area outlined on this map may consist of more than one kind of subsurface sediment. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

EXPLANATION

- Med. Fine Sand and Silt
- Clayey Sand
- Limestone
- Dolomite
- Peat

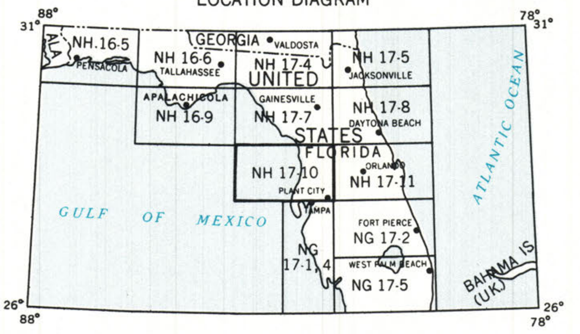
Scale 1:250,000



CONTOUR INTERVAL 50 FEET
WITH SUPPLEMENTARY CONTOURS AT 25 FOOT INTERVALS

ENVIRONMENTAL GEOLOGY SERIES
TARPON SPRINGS SHEET

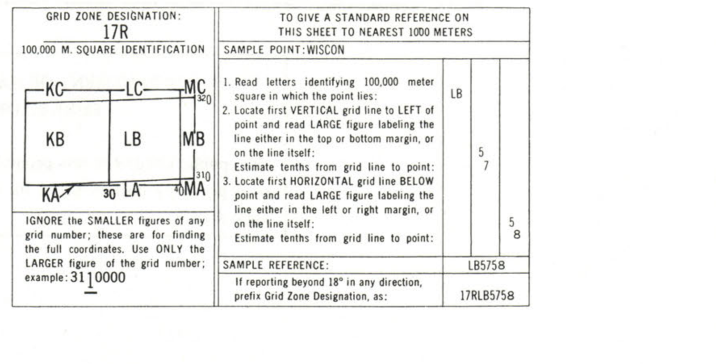
LOCATION DIAGRAM



SECTIONIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

TOWNSHIP OR RANGE LINE
LAND GRANT BOUNDARY



INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D. C.—1973

ENVIRONMENTAL GEOLOGY SERIES

TARPON SPRINGS SHEET

By

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DIVISION OF RESOURCE MANAGEMENT
BUREAU OF GEOLOGY

Tallahassee

1981

INTRODUCTION

Development of guidelines for wise management of Florida's natural resources depends upon a good working knowledge of the State's geology as it relates to man's environmental problems. Management decisions must be based upon adequate geologic data for such fields as waste disposal, water resources management, land management, highway construction, geologic hazards, soils mapping, mining and reclamation. Environmental geologic maps provide the basic data needed for the creation and execution of sound programs in the above-mentioned fields. It is intended that this map will not only serve these purposes, but it will also serve as a base map for future presentation of geologically related data of a more specialized or local nature. The ultimate purpose of the State's environmental geology mapping program is to insure development of Florida's natural resources with the least possible environmental damage.

This map presents geologic data in such a way that it can be understood by persons not specially trained in the science of geology. Common rock types are shown as they occur from just below the soils zone to depths of expected use for most purposes. Mapping involved aerial photographic and topographic interpretation and field work (visiting quarries, borrow pits, canals, road cuts and other rock exposures) to provide the necessary data points. Use was also made of all published and unpublished data in the files of the Florida Bureau of Geology plus published reports of the U.S. Geological Survey and the U.S. Soil Conservation Service.

LOCATION AND EXTENT

The study area is located in the west-central part of peninsular Florida. It is bounded on the north and south by the 29th and 28th north parallels of latitude, respectively. The eastern boundary is the 82nd west meridian of longitude and the western boundary is formed by the Gulf of Mexico.

The study area includes all of Pasco and Hernando counties, most of Citrus and Sumter counties, the northern part of Hillsborough and Pinellas counties, the northwestern corner of Polk County, and extreme southern Marion County. The land area of the map encompasses approximately 3,030 square miles (7,848 sq. km.).

The Hillsborough and Withlacoochee rivers are the two main waterways in the study area.

POPULATION

The 1980 population for the eight counties included in the study area is 2,137,076, according to the U.S. Census Bureau advance reports. The most populous county in the area is Pinellas (728,409), followed by Hillsborough (646,960), Polk (321,652), Pasco (194,123), Marion (122,488), Citrus (54,703), Hernando (44,469), and Sumter (24,272).

The population growth for the eight counties between 1970 and 1980 was 48.7 percent. For this period, Citrus County had the greatest increase with the 1980 population being 185.0 percent greater than that of 1970. It is followed by Hernando (161.5 percent), Pasco (155.6 percent), Marion (77.4 percent), Sumter (63.6 percent), Polk (40.8 percent), Pinellas (39.5 percent), and Hillsborough (32.0 percent).

The largest cities include Tampa (271,523), Dunedin (30, 203), Plant City (19,270), Tarpon Springs (13,251), New Port Richey (11,196), and Temple Terrace (11,097). These cities are located in Hillsborough, Pasco and Pinellas counties.

CLIMATE

The average temperature for the area is approximately 72°F (22°C). The highest average monthly temperature is approximately 82°F (28°C) occurring in August. Lowest temperatures occur in January and average 60°F (16°C) in the northern part of the area and 62°F (17°C) in the southern part.

Long term precipitation averages are variable throughout the area, ranging from about 51.5 inches (130.8 cm) at Tampa to about 58 inches (147.3 cm) at Brooksville. Most precipitation occurs during the summer with July being the wettest month. Winters are generally drier with November being the driest month.

TRANSPORTATION

The area is easily accessible by road. Interstate 4 runs east-west from near Daytona Beach to Tampa and Interstate 75 crosses the map area in a north-south direction. Other major east-west highways in the area are U.S. Highway 92 and Florida Route 50. Major north-south highways include U.S. 19, which follows the Gulf Coast, and U.S. routes 41, 98, and 301 which serve the interior.

Regular airline service is available to Tampa. Many of the smaller cities have local airports. Bus service is also available in most cities in the area. The area is also served by railroads and shipping lines which are primarily used by local industry.

INDUSTRY

Industry in the area is quite diverse, ranging from agriculture to mining to tourism. The two major commodities mined in the area are phosphate and limestone. Phosphate mining operations occur in the extreme southeastern part of the area. Hard rock phosphate has been mined in the past in parts of Citrus and Hernando counties in the northern part of the area. Limestone is quarried in several areas. Some sand, clayey sand, and dolomite are also quarried at various locations.

Citrus crops are grown in every county of the study area with Polk, Hillsborough, and Pasco counties accounting for the major citrus production. Truck farming is also important to the economy of the area while other crops, such as strawberries, are grown in the Plant City area. Cattle and poultry farming are also important to the economy of the area. Much of the land in the eight county region is used as pastureland.

Tourism is a very important local industry. The Gulf beaches and tourist attractions, such as Busch Gardens in Tampa, Cypress Gardens in Winter Haven and Disney World in Orlando, attract many tourists. The mild climate makes the area very attractive to retired persons and many retirement villages are found throughout the area.

A large state university, the University of South Florida, is located in Tampa. Many smaller colleges and universities also have campuses in the area.

GEOLOGY

One dominant structural feature, the Ocala Uplift, controls the outcrop patterns in the area. This feature has also been called the Ocala High or Ocala Arch and is described by Puri and Vernon (1964) as, "...a gentle anticlinal flexure about 230 miles long and 70 miles wide exposed near the surface in west-central Florida." The Ocala Uplift is not expressed topographically but is apparent in the outcrop patterns of the rocks. The effect is such that the oldest rocks are found in the northern part of the study area and the youngest rocks are found in the south and southwest parts of the study area.

The west-central peninsula of Florida consists of igneous and metamorphic basement rocks overlain by 4,000 feet (1,220-3,050 m) of sediments. The sediments are thickest in the southern part of the study area and are composed of a thick sequence of carbonates (limestones and dolomites) which are overlain by clastics that include quartz sands, silts, clayey sands, and clays.

Sediments exposed at the surface range in age from Middle Eocene (40-49 million years ago) to Holocene. The oldest rocks found near the surface are dolomites of the Avon Park Limestone. These rocks are exposed in Levy County, a few miles to the north of this map, and are the oldest rocks found at the surface in Florida. Other Eocene formations found in the area include the Inglis, Williston, and Crystal River formations which are collectively called the Ocala Group. One Oligocene unit (26-38 millions years old), the Suwannee Limestone, is found in the map area. Units of Miocene age (7-26 million years old) include the St. Marks, Hawthorn, Bone Valley, and Alachua formations. The Alachua Formation may range in age from Lower Miocene to Pleistocene, based on vertebrate fossil occurrences. Over most of the area, sands of variable thickness overlie these formations. This sand is believed to have been deposited during higher stands of sea level, and is not associated with any particular stratigraphic formation.

The Avon Park Limestone, Ocala Group, Suwannee Limestone, and St. Marks Formation are composed primarily of shallow marine carbonates, whereas the Alachua Formation is terrestrial clastics. The Hawthorn Formation is composed of both clastics and marine carbonates. The Bone Valley Formation is composed of clastics thought to be derived from reworking of the Hawthorn Formation.

Limestone is found near the surface over much of the study area. These limestones are within 10 feet (3m) of the surface in the blue colored areas (limestone lithology) of the map. They are generally overlain by sands and by clayey sands in the Brooksville Ridge, and Lake and Sumter uplands. These limestone units dip to the southwest away from the crest of the Ocala Uplift. The limestone areas, as shown on the map, do not correlate with any one particular stratigraphic formation.

Limestones found at the surface in the northern and eastern part of the study area are usually associated with the Eocene Ocala Group. The Ocala Group is found in the subsurface over most of the remainder of the study area. The Suwannee Limestone is exposed or is very near the surface in the area around Brooksville in central Hernando County, along the coast in western Hernando County, and along the upper part of the Hillsborough River valley. It is found in the subsurface south and west of these points and it overlies the Ocala Group limestone at many scattered locations along the Brooksville Ridge in Citrus County, including some parts of the limestone areas around Lecanto. Limestones found at the surface in the lower Hillsborough River valley and the coastal limestone area around Tarpon Springs belong to the St. Marks Formation. This unit has been called the "Tampa Limestone" or the "Tampa Formation" by some authors and is found in the subsurface in the southwestern part of the study area.

The limestones in the study area are highly variable, ranging from soft and friable to hard, well indurated, recrystallized varieties. They may be composed almost entirely of calcium carbonate or contain impurities such as sand, clay or chert. Color varies from white to cream to gray or tan, and the limestone may be very fossiliferous or almost barren of fossils.

The top of the limestone tends to be very irregular, especially in the Brooksville Ridge area where it may vary more than 100 feet (30 m) in elevation over a distance of a few hundred feet, making the area very difficult to map. This irregular surface was formed by dissolution of the limestone caused by acidic groundwater. Other effects of dissolution activity are caverns, sinkholes, pinnacles, solution pipes, and a "honeycomb-structure" of voids in the limestone.

Dolomite occurs at the surface only in the extreme northwestern portion of the area and is indicated by the lavender color on the map. The dolomite is associated with the Inglis Formation of the Ocala Group. Some of this material is a dolomitic limestone. A few quarries in the area penetrate to the underlying Avon Park Formation. The dolomite in this region is tan to brown, usually finely crystalline and varies from soft and porous to well indurated. The dolomite grades into the limestone region to the south. The eastern boundary of the area is formed by the 20-foot (6 m) contour. To the east the dolomite is overlain by sand of variable thickness that is associated with the Pamlico and Wicomico terraces (Vernon, 1951).

Sands of varying thickness occur over most of the study area. The medium fine sand and silt lithology occurs in three belts where these sands attain a thickness of greater than 10 feet. This lithology is indicated by yellow on the map. The sands are generally medium to fine grained, light in color, and usually do not contain appreciable amounts of gravel or heavy minerals. Thickness of the sand ranges from about 10 feet (3 m) to over 100 feet (30 m) in some areas.

Clayey sand has been mapped in the Brooksville Ridge, Sumter, Lake, and Polk uplands where the light green color occurs on the map. Much of the clayey sand in the southeastern part of the study area is associated with the Hawthorn Formation and is mapped above the 90-foot (27 m) contour. Usually, there is a sand veneer over the clayey sand, which obscures the sand-clayey sand boundary. Several hills in the Lake Thonotosassa area of Hillsborough County that have elevations greater than 90 feet (27 m) have been mapped as clayey sand.

The clayey sand lithology that extends from Zephyrhills to northern Citrus County is part of the Brooksville Ridge. These clayey sands also cap many of the hills in the limestone area around Brooksville. The thickness of the clayey sand is highly variable due to the irregular surface of the underlying limestone. This clayey sand is generally an orange to reddish orange in color. In some areas of eastern Citrus and Hernando counties these clayey sands may be part of the Alachua Formation. Another area of clayey sand occurs in the northeastern part of the study region; these clayey sands overlie Ocala Group limestones. No formation name has been appplied to these clayey sands.

Small areas of peat are found in many locations, but are only mappable southeast of Lake Okahumpka in Sumter County. This partly decayed plant matter is found in many swampy locations throughout the area.

Shells are found in much of the sand along the Gulf Coast, but the sand, shell and clay lithology is found only in the subsurface. Clay and sandy clay are also found only in the subsurface. Some of the clay occurs as a residuum overlying limestone. Thicker clay units are found in the subsurface of the south and southeast parts of the area and are associated with the Hawthorn Formation. Clays found in Citrus and Hernando counties may be part of what has been called the Alachua Formation (Vernon, 1951).

The limestone/dolomite lithology is also found only in the subsurface. This lithology usually occurs as part of the Inglis and Avon Park formations as shown in the cross-sections from the northern part of the study area and as part of the Hawthorn Formation in the southeast.

PHYSIOGRAPHY

Puri and Vernon (1964), and White (1970) named the physiographic provinces of Florida. Their classifications and names are used in this report. The peninsula of Florida has been divided into three physiographic zones: these are the Southern or Distal Zone, the Central or Midpeninsular Zone, and the Northern or Proximal Zone (White, 1970). The Tarpon Springs Sheet falls entirely in the Central or Midpeninsular Zone, which is characterized by a series of ridges and valleys that parallel both the Atlantic coastline and the longitudinal axis of the peninsula. The area is also divided into two physiographic provinces, the Gulf Coastal Lowlands and the Central Highlands, based on general topography. These features have been further subdivided into smaller physiographic units based on local topographic features.

The Gulf Coastal Lowlands is a poorly drained area of low relief which extends in a north-south direction adjacent to the Gulf of Mexico. In the northern part of the area the eastern boundary of the lowlands is marked by a seaward facing scarp that roughly parallels the coastline from near Crystal River to a point about 10 miles (16 km) northeast of Brooksville. Here, the elevation difference between the Gulf Coastal Lowlands and the Brooksville Ridge is generally greater than 50 feet (15 m). In the southern part of the area the lowlands are wider and the boundary between the two regions is less pronounced than in the north.

The Gulf Coastal Lowlands are composed of sands and clayey sands of varying thickness overlying limestone and/or dolomite. The sand ranges in thickness from zero to over 50 feet (15 m). North of Tarpon Springs the sands are very thin or absent near the coast. It is in these areas that coastal swamps have formed. Puri and Vernon (1964), and White (1970) defined the Coastal Swamps region of the Gulf Coastal Lowlands as including all continuous swamps that are adjacent to the Gulf of Mexico. This area is located between New Port Richey and the northern boundary of the map and occurs as a narrow strip that reaches its widest point near the Citrus-Hernando county line. This area usually occurs at elevations of less than 10 feet (3 m) above mean sea level. On this section of the coast wave energy is very low and well-developed sand beaches have not formed.

Four marine terraces are found in the Gulf Coastal Lowlands. A marine terrace is a gently sloping or nearly horizontal surface which was formed by an ancient sea. The landward end of this surface is usually marked by a seaward facing escarpment. These terraces are usually covered with sands or clayey sands. The terraces recognized on the Gulf Coastal Lowlands are the Silver Bluff Terrace from one to 10 feet (0-3 m) above mean sea level; Pamlico Terrace, from 8-25 feet (2-8 m); Talbot Terrace, from 25 to 42 feet (8-13 m); and the Penholoway Terrace, from 42-70 feet (13-21 m) above present mean sea level (Healy, 1975). The Silver Bluff Terrace is only recognized in a small area in northwest Citrus County. The Pamlico, Talbot, and Penholoway terraces are found throughout most of the Gulf Coastal Lowlands with the Pamlico Terrace being the most extensive in this area.

Marine terraces can be traced to the highest elevations over much of Florida. The higher terraces represent ancient sea levels whose years may be much older than those of the lower terraces mentioned above. These high terraces include the Wicomico Terrace, from 70 to 100 feet (21-30 m) above mean sea level; Sunderland Terrace, from 100 to 170 feet (30-52 m); and the Coharie Terrace, from 170 to 215 feet (52-66 m) above present sea level (Healy, 1975).

Associated with these terraces and ancient sea levels are coastal features, such as dunes, beach ridges, barrier/lagoon complexes, and near shore/beach sediments. Many relict dunes are found in the map area. They occur as dune fields and large isolated dunes. Dune fields are especially prominent in the western parts of Hernando and Pasco counties. Many of the dunes are found associated with the Pamlico Terrace and seem to indicate that much more sand was available for the building of beaches and dunes than is present in the area today. The source of this sand may have been from the Brooksville Ridge clastics (White, 1970). There are also some indications of an ancient barrier island/lagoon system in the northwestern part of the map area which would also indicate a much greater supply of sand in the past. The only barrier island/lagoon complexes found in the area today are from Anclote Key south to the Naples area, south of this map area, possibly indicating a change in sand source and/or supply (White, 1970).

East of the Gulf Coastal Lowlands is a highland area known as the Brooksville Ridge. This ridge is about 110 miles (177 km) long and from five to 20 miles (8-32 km) wide and is aligned in a direction which roughly parallels the Atlantic coast and the axis of the peninsula.

The Brooksville Ridge extends from eastern Lafayette County, which lies off this map to the north, southward to the Zephyrhills area of southern Pasco County. The ridge can be divided into two parts which are separated by the Dunnellon Gap and the Withlacoochee River. The southern part of the ridge, which is on this map, is larger and higher than the northern part. Elevations in this area range from about 75 feet (23 m) above mean sea level to over 250 feet (76 m).

Sediments of the Brooksville Ridge include sands, sandy clays, and clayey sands which overlie limestones and dolomites of Oligocene and Eocene age. Surface drainage is not well developed on the Ridge and, though there are few persistent valleys, the surface is very irregular with many high hills.

The upper surface of the carbonates is found at a higher elevation under the Brooksville Ridge than in the adjacent lowland areas. This is probably due to less dissolution of the carbonates on the ridge where overlying insoluble clastics are thicker than in the adjacent lowlands, where the limestone is at or near the surface (White, 1970). Elevations of the tops of the limestones are highly variable along the ridge. This variation may exceed 100 feet (30 m) over very short distances.

The Western Valley lies east of the Brooksville Ridge. This is an area of low relief and poor drainage in which many swamps are found. The largest of these swamps, the Green Swamp, is located in parts of Lake, Sumter and Polk counties. The Western Valley extends from the High Springs Gap in western Alachua County southward approximately 140 miles (225 km) to the Zephyrhills Gap in Pasco and Hillsborough counties. This trend is the same as that of the Brooksville Ridge to the west and of the ridges to the east. Elevations of the Western Valley range from about 50 feet (15 m) to about 100 feet (30 m) above mean sea level.

The Tsala Apopka Plain is a lower and flatter portion of the Western Valley. It is located in eastern Citrus, Hernando, and Pasco counties, and western Sumter County. The plain is now occupied by Tsala Apopka Lake, Lake Panasofskee, and many smaller lakes. These lakes are believed to be the remnants of a much larger lake. The Withlacoochee River and many swamps are also found in this area.

The Western Valley is connected with the Gulf Coastal Lowlands to the west by the Dunnellon Gap and the Zephyrhills Gap. The connection between the Western Valley and the Central Valley to the east is through the Lake Harris Cross Valley located in northeastern Sumter County and west-central Lake County.

Parts of four other upland areas, the Sumter, Lake, and Polk uplands, and the Lakeland Ridge, are located in the study area. The Polk Upland occupies most of Polk County and parts of Hillsborough, Hardee, and Manatee counties. Elevations of the highland range from 100 to 130 feet (30-40 m) above sea level. The Bone Valley Formation overlies the Hawthorn Formation under much of the Polk Upland. Surface drainage is more pronounced on the Polk Upland than elsewhere in the map area.

Several areas of higher elevations and greater local relief rise above the Polk Upland. Only one of these, the Lakeland Ridge, is found in the extreme southeastern part of the map area and parallels other ridges of the mid-peninsular zone. The Lakeland Ridge has elevations which range from about 150 (46 m) to over 200 feet (61 m) above sea level and is believed to be an erosional remnant of what was once a much broader highland (Puri and Vernon, 1964). This ridge is composed of sands and clayey sands which overlie the phosphatic clayey sands and clays of the Bone Valley and Hawthorn formations.

The Lake and Sumter uplands are found in the extreme eastern part of the area. They are distinguished from the lowlands by the fact that the average elevations are somewhat higher and drainage is better than in the lowlands. Both uplands are about 35 miles (56 km) long and 15 miles (24 km) wide and have the same trend as other ridges of the mid-peninsular zone.

The Lake Upland is characterized by relict beach ridges and the presence of many lakes between these ridges. Elevations are generally higher in the southern part of the highland and decrease northward. Elevations range from 125 to 150 feet (38-46 m).

The Sumter Upland has few lakes and a lower average elevation than the Lake Upland. Elevations range from about 75 to 100 feet (23-31 m) above mean sea level. Sediments characterizing the Sumter and Lake uplands include sands and clayey sands overlying limestones and dolomites.

The Lake and Sumter uplands are separated by the Lake Harris Cross Valley, which connects the Western Valley with the Central Valley in northeastern Sumter County. An arbitrary boundary is drawn between the Lake and Polk uplands.

GROUNDWATER

When rain falls on the surface of the earth some of the water flows over surface as runoff and some evaporates and is returned to the atmosphere as water vapor. The remainder soaks into the groud and part is used by plants, and a portion may percolate down through the ground to recharge aquifers.

An aquifer is defined as a lithologic unit that will yield water in useful quantities to wells. Two types of aquifers exist, confined and unconfined. An unconfined aquifer, or water-table aquifer, is one which is in direct contact with the atmosphere through pore spaces. The confined aquifer is one in which a relatively impermeable material lies between the water bearing unit and the surface. The relatively impermeable units are knows as aquitards or aquicludes. Groundwater moves vertically and laterally under the influence of gravity from areas of recharge to areas of discharge, such as rivers and springs.

Two aquifer systems, the surficial, shallow, or water table aquifer and the Floridan Aquifer, occur within the Tarpon Springs study area. The Floridan Aquifer is the principal aquifer supplying most of the water used in the area. It is composed of limestones and dolomites of Tertiary age and, in the study area, includes the Lake City Limestone, Avon Park Limestone, Ocala Group limestones, Suwannee Limestone, St. Marks Formation (Tampa limestone), and any hydrologically connected limestones or dolomites of the Hawthorn Formation (Cherry, et al., 1970).

The top of the Floridan Aquifer is defined as the first consistent limestone below which no clay confining beds occur. The configuration of the top of the aquifer is highly variable due to erosion and dissolution in the limestones that form its upper surface. The elevation of the top of the aquifer ranges from slightly below sea level to more than 100 feet above sea level. The lowest areas occur along the Gulf Coast and the southern border of the map. The highest areas are found along the Brooksville Ridge of Hernando and Pasco counties and in the Green Swamp.

The general direction of water movement in the Floridan Aquifer is from east to west, except in the extreme southern part of the area where it is from the north to the south and southwest. Recharge of the Floridan Aquifer occurs from the overlying water-table aquifer in areas where it is in direct contact with the Floridan or through leaky confining beds between the Floridan and the water-table aquifer. Recharge can occur where the limestone is exposed at the surface or is overlain by a thin veneer of sand, and where there are lakes, sinks and rivers. In areas where the potentiometric surface of the Floridan is higher than the water table, discharge from the Floridan Aquifer to the water-table aquifer may occur. Discharge also occurs through springs, seeps into rivers and lakes, and water wells.

Water wells drilled into the Floridan Aquifer will usually yield at least 250 gallons (946 liters) per minute of fresh water. Exceptions to this include some coastal areas where salt water intrusion may become a problem during heavy pumpage. In the locations where wells yield large amounts of water they are usually drilled into limestones and dolomites which have solution cavities, and in some cases, caverns. The diameter of the well, pumping time and drawdown also influence the well yield. In this area, the most productive zones in the Floridan Aquifer are the uppermost limestones underlying the surficial sands, the lower part of the Suwannee Limestone, the lower part of the Avon Park Limestone, and the upper part of the Lake City Limestone (Cherry, et al., 1970).

Potable water zones in the Floridan Aquifer range in thickness from near zero in coastal areas to over 2000 feet (610 m) along much of the eastern boundary of the area. Water is considered potable if it contains less than 500 parts per million (ppm) total dissolved solids. Water quality in the map area tends to be better inland than near the coast, with total dissolved solids being less than 250 ppm (Shampine, 1975).

The shallow aquifer, or water-table aquifer, is found where sands overlie the limestones and dolomites of the Floridan Aquifer. The thickness of the shallow aquifer is highly variable due to large variations in the thickness of sands. The shallow aquifer may directly overlie the Floridan Aquifer, or they may be separated by clays or other relatively impermeable units. Recharge to the water-table aquifer is almost entirely from local rainfall, except in those areas where it is hydraulically connected to the Floridan Aquifer. Discharge from the shallow aquifer may be by downward percolation into the Floridan Aquifer, seepage into streams, lakes, sinkholes, and pumpage from wells. The shallow aquifer is mainly used for small domestic supplies.

ECONOMIC GEOLOGY

A variety of economically useful commodities occur within the area. These include phosphate, limestone, dolomite, sand, clayey sand, and a small amount of peat.

Phosphate occurs as hard rock and land pebble deposits. The land pebble district, which is located in the extreme southeastern portion of the map, is known as the Central Florida Phosphate District. The phosphate, which is mined from the Bone Valley and Hawthorn formations, occurs as particles ranging from clay size to pebbles over an inch (2.54 cm) in diameter which are found in a matrix of sand and clay. Florida phosphate production in 1978 supplied over 80 percent of the national output and over 30 percent of the world's output (Sweeney and Windham, 1979). The largest phosphate deposits occur south and southeast of the study area and have been mined continuously since 1890.

Hard rock phosphate occurs in a northwest-southeast trending area extending from eastern Hernando County to the northern border of the map in eastern Citrus County. These deposits are no longer mined, but production did occur from 1883 to 1966.

Most of the phosphate is used in the production of fertilizer. Other uses include the manufacture of detergents, water softeners, and metal polishes. Uranium is found associated with phosphate. At present, several companies are separating uranium as a by-product of phosphate production (Sweeney and Windham, 1979).

Limestone is mined at several localities, including the Lecanto area of Citrus County, eastern and northeastern Sumter County, northwest and southeast Pasco County, and in central and eastern Hernando County. Most of the limestone is mined from the Crystal River Formation, Williston Formation and Suwannee Limestone. Some of the limestone found in the Crystal River Formation is over 99.5 percent calcium carbonate. Most limestone is mined for use as road base material. Other uses include cement aggregate, soil conditioners, asphalt filler material, erosion control structures (rip-rap). Limestone is a basic ingredient in the production of Portland cement. All of the limestone is mined by open pit methods using draglines and occasional blasting.

Dolomite is mined in the northwestern part of the study area. These dolomites are associated with the Inglis and Avon Park formations. All of the dolomite mined in the area is used for agricultural purposes. Other potential uses of dolomite are as a refractory material and rip-rap.

Sand and clayey sand is mined in many locations throughout the study area. Clayey sands are found in the Brooksville Ridge and other upland areas. Sand is found in most parts of the study area with the thickest deposits being near the coast. These materials are used locally for construction purposes, fill, road base materials, and in asphalt production.

Small scattered peat deposits occur throughout the region. Davis (1946) reported that peat has been mined at two locations between Tampa and Plant City. This material was used for fertilizer filler and soil conditioner. Some clay is found at scattered localities along the Brooksville Ridge. Several oil and gas exploration wells have been drilled in the study area but no petroleum has yet been discovered.

OUTCROPS OF INTEREST

1. Hillsborough County, Township 28S, Range 21E, Section 23. Sandy limestone with phosphate pebbles and clay exposed in creek.
2. Pinellas County, Township 27S, Range 15E, Section 26. 10 to 20 feet (3-6 m) of unconsolidated sand exposed in pit dug into sand ridge.
3. Pasco County, Township 25S, Range 21E, Section 12. Pit exposing 10 to 20 feet (3-6 m) of clayey sand typical of the Brooksville Ridge.
4. Hernando County, Township 21S, Range 19E, Section 22. Abandoned limestone quarry exposing Suwannee and Ocala Group limestones. For a description of this locality see Florida Bureau of Geology Bulletin 54, pages 23-26.

Many abandoned limestone quarries are found in the Brooksville area. Abandoned hard rock phosphate operations are found near U.S. Route 41 from the Floral City area to Dunnellon and also in northeastern Hernando County.

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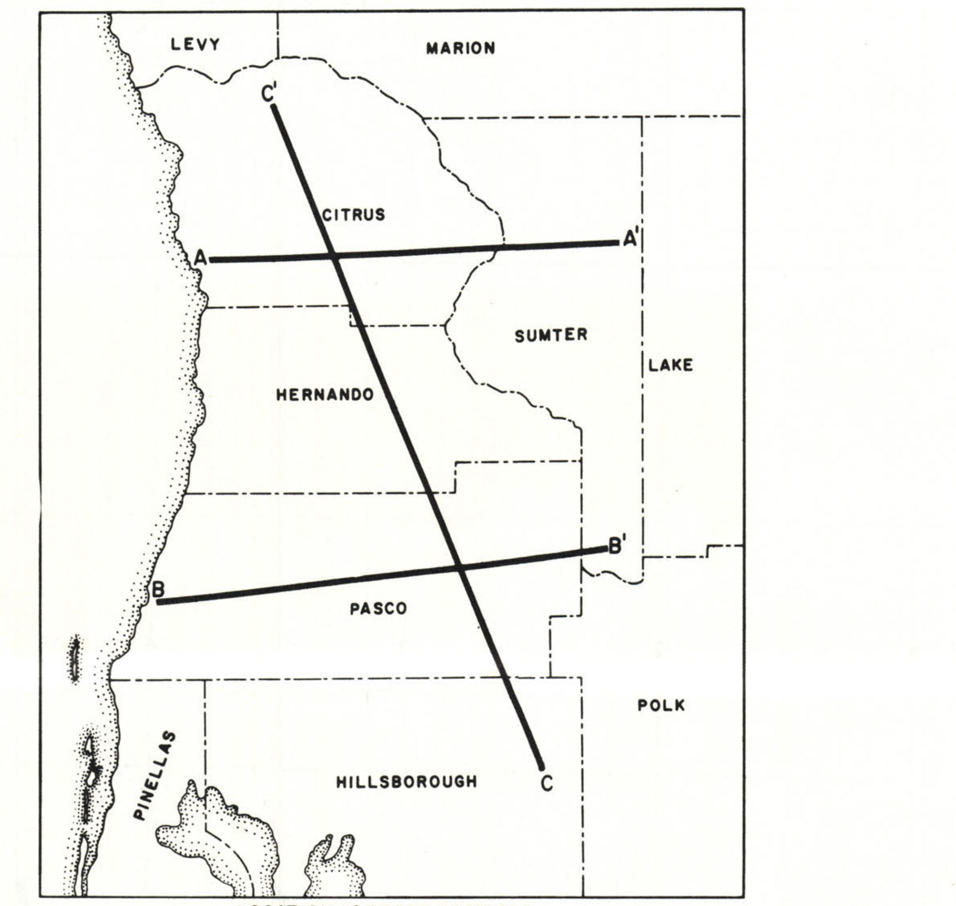
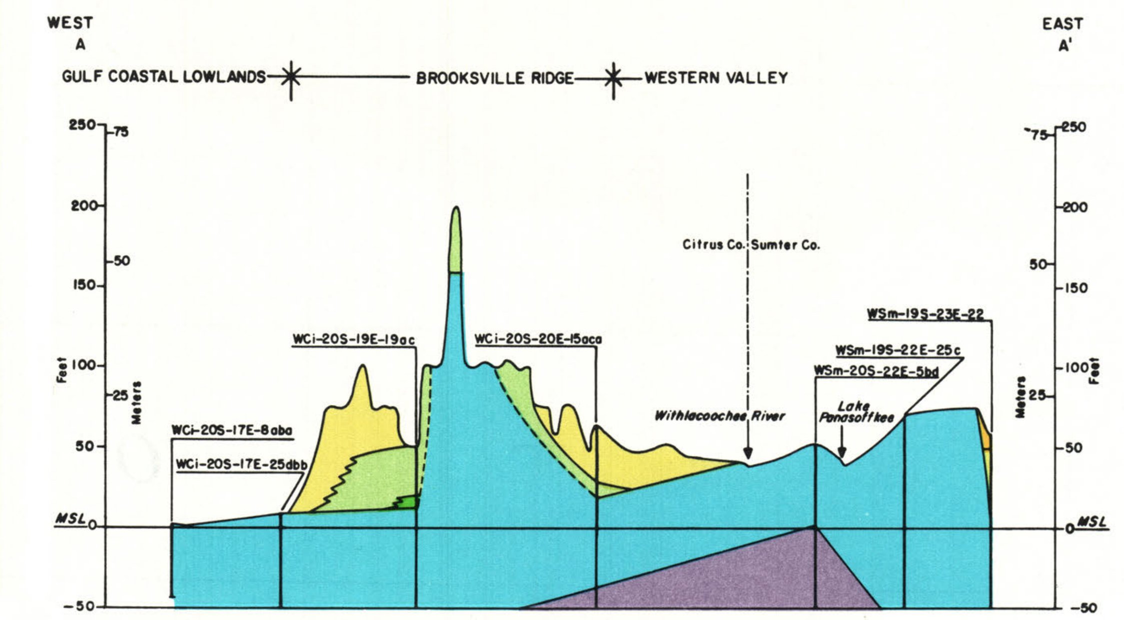
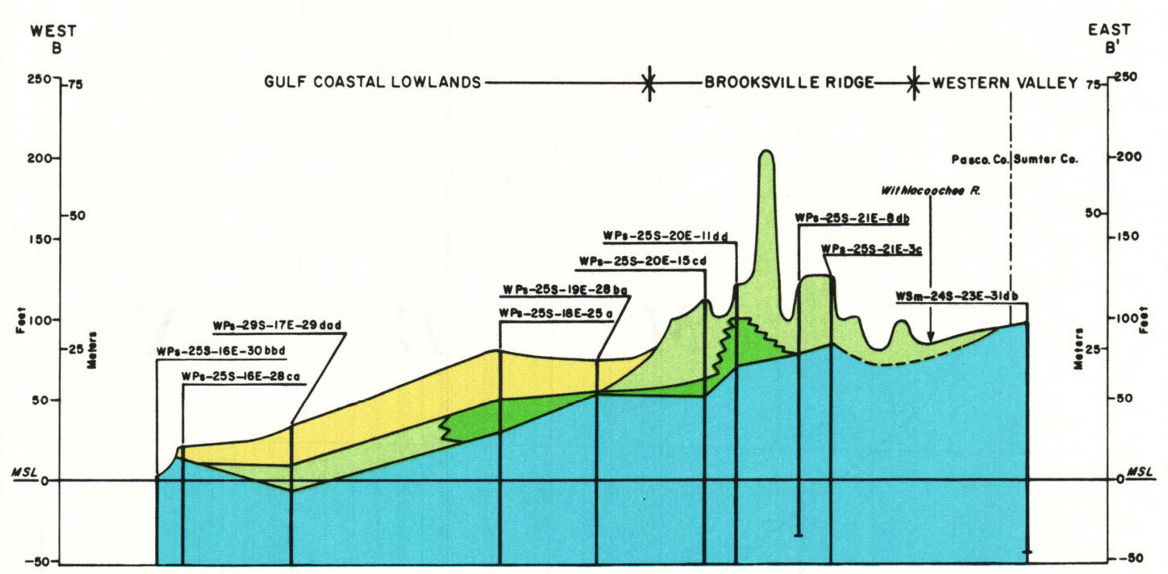
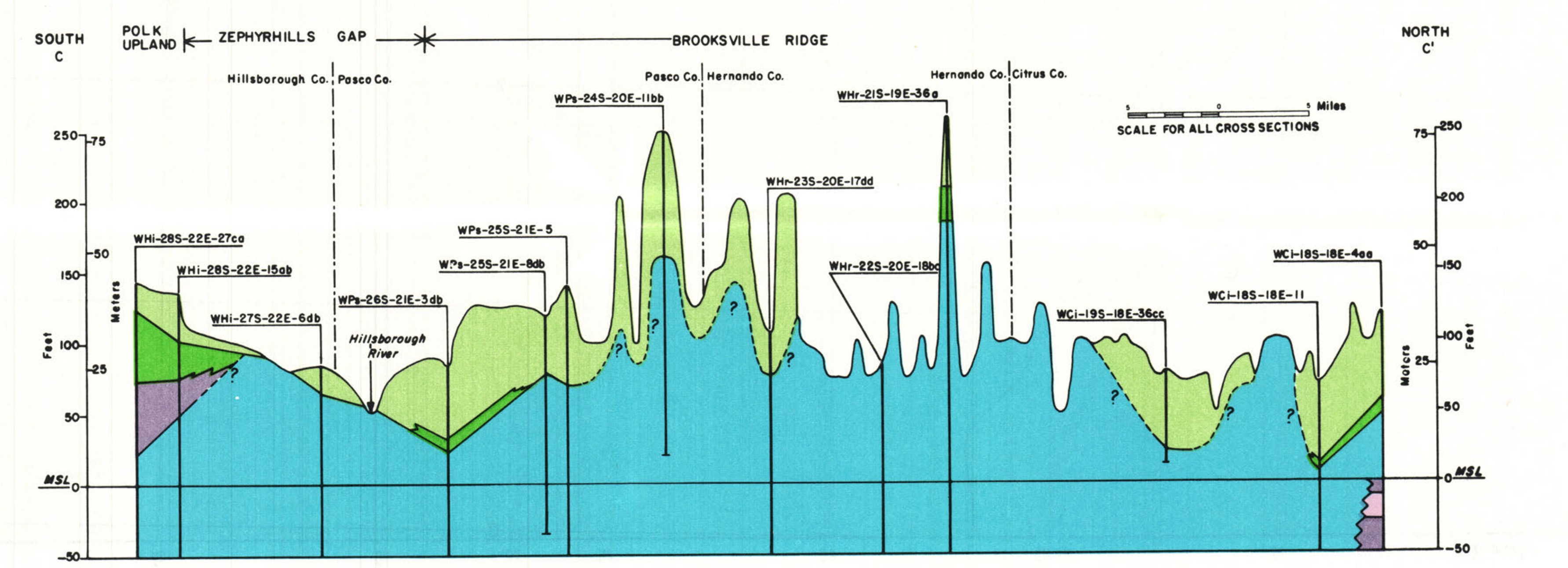


LOCATION of CROSS SECTIONS







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