U. S. DEPARTMENT OF THE INTERIOR
U. S. GEOLOGICAL SURVEY

OPEN-FILE REPORT 95-261
PLATE 1 of 5

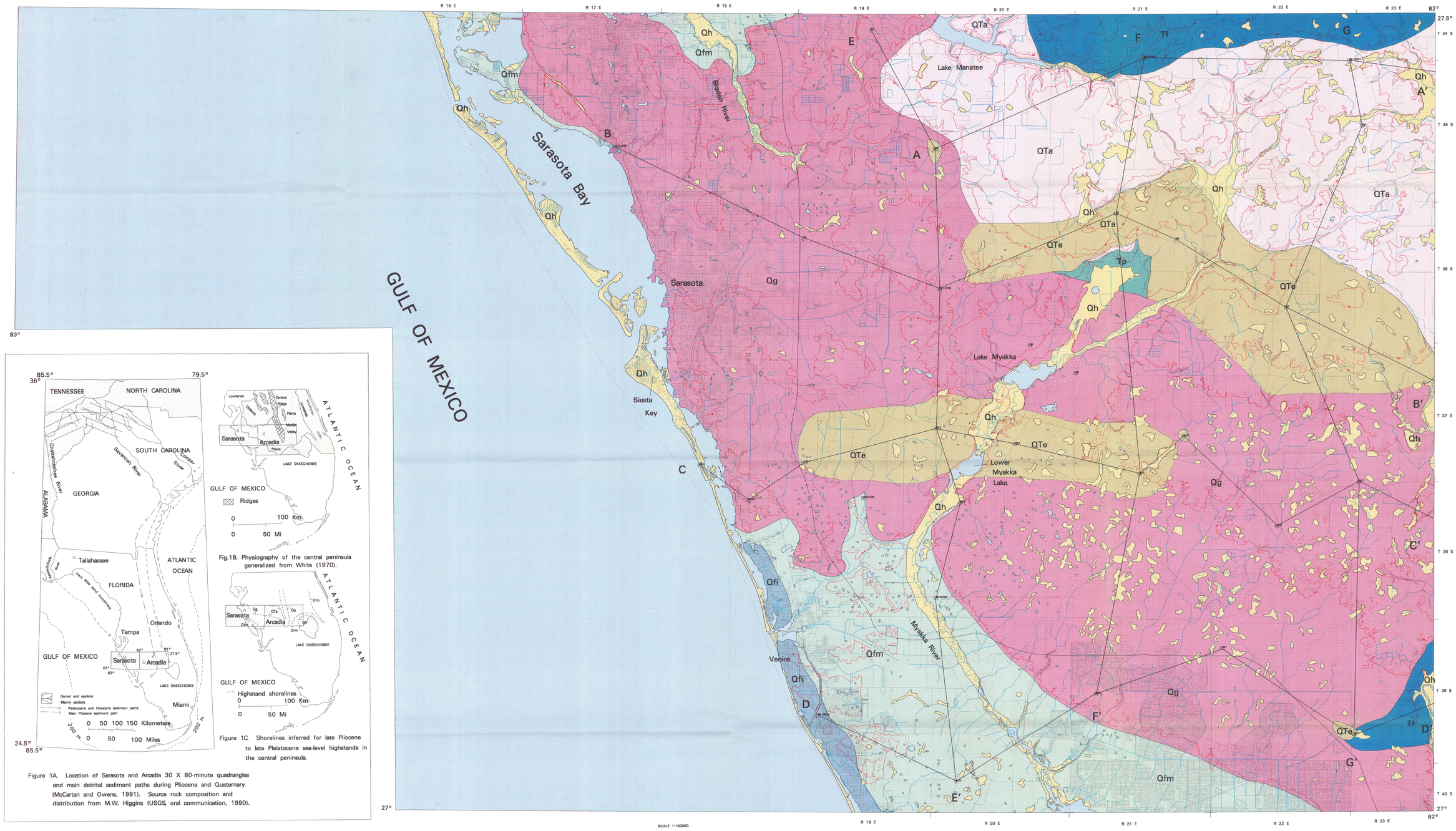
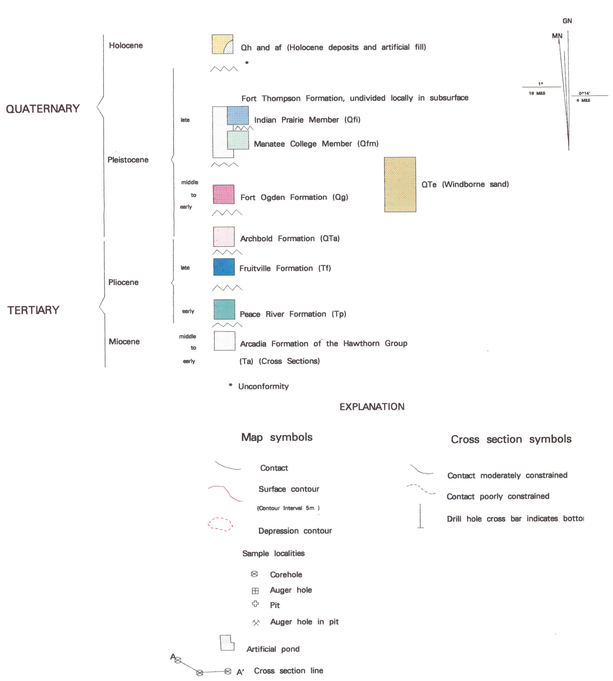


Figure 1A. Location of Sarasota and Arcadia 30 X 60-minute quadrangles and main detrital sediment paths during Pliocene and Quaternary (McCartan and Owens, 1991). Source rock composition and distribution from M.W. Higgins (USGS, oral communication, 1990).

Fig.1B. Physiography of the central peninsula generalized from White (1970).

Figure 1C. Shorelines inferred for late Pliocene to late Pleistocene sea-level highstands in the central peninsula.

CORRELATION OF MAP UNITS



PLATES

1 Geologic Map of the Sarasota 30 x 60-minute Quadrangle
Figure 1, Tables 1 and 2, and Description and Correlation of Map Units

2 Geologic Map of the Arcadia 30 x 60-minute Quadrangle and text

3a Lithologic Columns for the Sarasota Quadrangle and Explanation

3b Lithologic Columns for the Arcadia Quadrangle

4 Cross Sections and Index Maps

5 Structure Contours and Isopach Map (Figures 3-9)

SCALE 1:100000

Table 1. Locality index. USGS=U.S. Geological Survey; FGS=Florida Geological Survey; A=auger; C=core; P=pit; ROMP=Regional Observation Monitor Project, Southwest Florida Water Management District designation; S1 to S22= auger and pit samples in Sarasota quadrangle; A1 to A43= auger and pit samples in Arcadia quadrangle; W-15166, FGS designation for corehole

Sarasota 30x60-minute quadrangle

USGS	FGS	Type	Latitude	Longitude
S1	(Rye Road)	P	27°29′27″	82°23′56″
S2	AMN1	A	27°24′56″	82°21′07″
S3	APAC,Qual.Ag.	P	27°21′34″	82°26′38″
S4	AMN5	A	27°22′22″	82°13′12″
S5	AMN3	A	27°21′15″	82°10′26″
S6	AHD1	A	27°25′47″	82°03′02″
S7	AMN4	A	27°18′52″	82°06′17″
S8	ASA5	A	27°17′36″	82°17′16″
S9	AMN2	A	27°15′20″	82°15′11″
S10	ASA7	A	27°13′10″	82°31′06″
S11	ASA1	A	27°13′08″	82°26′34″
S12	ASA6	A	27°14′23″	82°20′02″
S13	ASA8	A	27°13′52″	82°17′41″
S14	AMN7	A	27°12′43″	82°12′26″
S15	AMN8	A	27°14′11″	82°10′29″
S16	ASA2	A	27°10′46″	82°06′33″
S17	ADS4	A	27°12′45″	82°03′20″
S18	ASA11	A	27°11′41″	82°18′03″
S19	ASA10	A	27°01′11″	82°20′07″
S20	ASA9	A	27°03′39″	82°13′15″
S21	ASA3	A	27°06′13″	82°09′08″
S22	ADS3	A	27°02′56″	82°03′16″
W-15166	W-15166	C	27°28′06″	82°34′39″
W-16257	W-16257	C	27°28′12″	82°03′44″
W-16782	W-16782	C	27°08′04″	82°21′03″
W-16783	W-16783	C	27°19′38″	82°20′51″
W-16784	W-16784	C	27°28′31″	82°12′24″
W-16814	W-16814	C	27°11′38″	82°25′59″
W-30014	W-30014	C	27°11′42″	82°29′10″
Walton	---	C	27°11′43″	82°24′03″

Arcadia 30x60-minute quadrangle

USGS	FGS	Type	Latitude	Longitude
A1	---	A	27°29′40″	81°50′48″
A2	---	A	27°27′09″	81°37′27″
A3	---	A	27°28′17″	81°31′02″
A4	---	A	27°23′02″	81°23′40″
A5	---	A	27°26′06″	81°19′33″
A6	---	A	27°25′48″	81°09′30″
A7	---	A	27°25′30″	81°08′25″
A8	---	A	27°28′56″	81°00′18″
A9	---	A	27°23′54″	81°56′17″
A10	---	A	27°20′50″	81°47′34″
A11	---	A	27°22′05″	81°42′53″
A12	---	A	27°22′24″	81°39′59″
A13	---	A	27°21′40″	81°10′07″
A14	---	A	27°22′17″	81°05′02″
A15	ADS1	A	27°15′34″	81°58′32″
A16	---	A	27°13′52″	81°53′28″
A17	---	A	27°13′35″	81°51′18″
A18	---	A	27°17′34″	81°40′36″
A19	---	A	27°17′35″	81°33′54″
A20	---	A	27°13′11″	81°40′35″
A21	---	A	27°12′45″	81°33′54″
A22	---	A	27°14′24″	81°23′50″
A23	---	A,P	27°15′13″	81°20′32″
A24	---	A	27°17′21″	81°08′24″
A25	---	A	27°11′48″	81°50′36″
A26	Carlton 2x4	A,P	27°09′22″	81°47′36″
A27	---	A	27°10′53″	81°21′09″
A28	---	A	27°11′05″	81°20′19″
A29	---	A	27°11′27″	81°13′16″
A30	---	A	27°11′28″	81°12′34″
A31	---	A	27°09′28″	81°05′43″
A32	---	A	27°06′22″	81°59′48″
A33	---	A	27°04′23″	81°59′00″
A34	Desoto4	A	27°02′36″	81°49′03″
A35	Desoto5	A	27°02′15″	81°48′25″
A36	---	P	27°01′05″	81°29′49″
A37	---	A	27°03′44″	81°27′16″
A38	---	A	27°01′21″	81°26′28″
A39	---	A	27°04′19″	81°24′27″
A40	---	A	27°03′22″	81°23′51″
A41	---	A	27°01′20″	81°18′07″
A42	---	A	27°00′44″	81°11′33″
A43	---	A	27°04′41″	81°09′11″
W-11946	W-11946	C	27°28′20″	81°41′41″
W-12050	W-12050	C	27°10′21″	81°43′22″
W-12312	W-12312	C	27°04′34″	81°34′19″
W-13514	W-13514	C	27°27′12″	81°54′59″
W-15303	W-15303	C	27°10′24″	81°58′36″
W-15648	W-15648	C	27°27′48″	81°47′49″
W-16578	W-16578	C	27°02′25″	81°44′30″
W-17000	W-17000	C	27°22′06″	81°26′05″
W-17001	W-17001	C	27°09′01″	81°21′10″

Table 2. Characteristics of Map units: Sarasota and Arcadia, Florida 30 x 60 - Minute Quadrangles

SYMBOL	UNIT NAME	AGE	ELEVATION OF UPPER SURFACE (M) SAR.	ELEVATION OF UPPER SURFACE (M) ARC.	THICKNESS (M) SAR.	THICKNESS (M) ARC.	LITHOLOGY	WEATHERING (W)	COLOR	COVERAGE OF AREA (%) SAR.	COVERAGE OF AREA (%) ARC.
Qh	Holocene deposits	<18Ka	- - -		7	9	Quartz sand, mud (silt and clay); locally shelly; phosphate pebbles in a few places	Several % epidote and garnet at surface (W=0 m)	White, tan, black	10	8
Qf (undiff.	Fort Thompson Formation (undivided)	100 - 320Ka	- 3	- -	10	- -	Quartz sand, fine to medium, locally muddy, shelly; phosphate pebbles, calcareous matrix in a few places	W=1-3 m; shells retain some color; aragonite present locally	Pale green gray; medium gray; tan	- - - (subsurface Sarasota only)	
Qfi	Indian Prairie Member	100Ka	5	5	7	9	Quartz sand, fine to medium,; locally muddy, shelly; phosphate pebbles in a few places	W=1-2 m; shells retain some color; aragonite present	Tan, medium gray	3	3
Qfm	Manatee College Member	200Ka	6	10	9	20	Quartz sand, fine, silty, shelly; clay beds	W=2-3 m; shells retain some color	Tan, pale yellow gray; clay is green	14	8
Qg	Fort Ogden Formation	450Ka-1.25Ma	20	22	12	18	Quartz sand, fine to medium, muddy, shelly, phosphate pebbles in places	W=3-4 m; all shells white, tan, or black; no aragonite	Pale yellow gray to medium orange	43	27
Qta	Archbold Formation	1.8-2.0Ma	28	60	25	67	Quartz sand, medium to coarse; shelly; clay beds; locally muddy, calcareous/dolomitic; phosphate and quartz pebble beds	W=12 m	White, medium gray to pale orange	16	24
Tf	Fruitville Formation	2.0-3.4Ma	30	35	20	68	Quartz sand, muddy layers; locally shelly, calcareous/ dolomitic; sparse phosphate	W=>20	White, medium to dark gray, tan, pale orange	3	2
Tp	Peace River Formation	5Ma	13	20	35	48	Quartz and phosphate sand; clay; limestone/dolomite beds; locally shelly; quartz and phosphate pebble beds.	Generally stripped	Light to dark gray green; tan, brown, black-and-white	<1	<1
Ta	Arcadia Formation	16-30Ma	4	10	>34	>30	Dolomite, limestone; muddy, quartz sand with carbonate matrix; phosphatic, shelly in places	Generally stripped	White, light to dark gray green; pale olive; gray; pale orange	<1	<1
QTe	Windborne deposits	<1.8Ma	27	65	15	15	Quartz sand, fine to medium; trace silt and clay	Very weathered except youngest deposits	White, yellow, pale orange	12	27

MAP UNITS--SARASOTA AND ARCADIA QUADRANGLES, FLORIDA

Qh--Deposits of Holocene age (includes af, artificial fill, except in a few places, such as along the Kissimmee River, along the eastern edge of the Arcadia quadrangle, where it is shown separately): Fine to coarse quartz sand and shells with very little silt and clay but abundant heavy minerals in places, typically pale orange to pale yellow gray or pale greenish gray, 1-5 m thick, found in modern ocean and bay beaches; fine to coarse quartz sand and mud (mixture of clay and silt), some clasts of clay, limestone, dolomite, or sand cemented with iron oxide, typically pale orange to pale yellow, 1-5 m thick, found along streams and lake shores; fine to medium quartz sand, typically with plant fragments, white to black (with plant fragments), 1-3 m thick, found in modern swamps; much of the sand in swamps without flowing water is windborne. All deposits are unconformable on underlying deposits, which include all the other map units. Upper surface is the modern land surface. Most Holocene windborne deposits are mapped with older windborne deposits as "QTe" (see below). Includes large piles of dredged spoil (af, artificial fill) along the Kissimmee River.

Qf--Fort Thompson Formation (middle to late Pleistocene): Consists of unconsolidated deposits of the Indian Prairie Member and the Manatee College Member, described below, and similar related deposits that may be the same age or slightly older, which are found in the subsurface beneath Siesta Key, on the Gulf coast in the Sarasota quadrangle, and north of Lake Okeechobee, east of the map area.

Qfi--Indian Prairie Member of the Fort Thompson Formation (late Pleistocene): Fine to coarse quartz sand, very clayey and shelly in places; heavy minerals, feldspar, and shells are almost unaltered, as shown by the presence of several percent of epidote, garnet, and feldspar, and the presence of aragonite in samples within the top few meters of drill holes. Colors are typically pale orange, pale yellow gray, and white. The Indian Prairie Member is found mainly below 5 m elevation, and it is 1-10 m thick. It unconformably overlies the older member of the Fort Thompson Formation, the Fort Ogden Formation, the Archbold Formation, and the Fruitville Formation and is unconformably overlain only by Holocene deposits. Age, inferred from stratigraphic position, fossil assemblages, mineral weathering profiles and uranium-disequilibrium series age estimates on corals, mollusca, and limestone samples outside the map area is about 100 Ka (Osmond and others, 1965; Karrow and Belknap, 1990; Muhs and others, 1992).

Qfm--Manatee College Member of the Fort Thompson Formation (late Pleistocene): Fine to coarse quartz sand, clayey and shelly in places; heavy minerals, feldspar, clay, and shells more weathered than those in the Indian Prairie Member but fresher than in the Fort Ogden Formation. Colors are typically pale to medium orange and yellow gray. The Manatee College Member is found mainly below 10 m elevation, and it is 1-20 m thick. It unconformably overlies the Fort Ogden, Archbold, and Fruitville Formations and is overlain only by the younger member of the Fort Thompson Formation and Holocene deposits. The age is about 200 Ka on the basis of stratigraphic position, fossil assemblages, mineral weathering profiles, uranium-series and amino-acid racemization age estimates on corals and shells from outside the map area (Karrow and others, 1990; Muhs and others, 1992).

Qg--Fort Ogden Formation (early to middle Pleistocene): Quartz sand, locally muddy, shelly, and pebbly. Pebbles are mainly phosphate but there are a few quartz granules present. Colors are mainly tan and pale orange in the sandy beds, and dark gray-green to pale green in the clay-rich beds. Epidote and garnet are dissolved to depths of 3-4 m. The Fort Ogden is the highest of the lowland units, and the highest shoreline, where the Fort Ogden is beveled into the Archbold Formation, is typically between 10 and 22 m elevation. The Fort Ogden unconformably overlies the Archbold and Peace River Formations, and is overlain unconformably by the Fort Thompson Formation and Holocene deposits. The age of the Fort Ogden, based on stratigraphic correlation with units outside the map area, is between 1.25 Ma and 450 Ka.

QTa--Archbold Formation (late Pliocene or early Pleistocene): Quartz sand, fine to coarse, with local concentrations of shells and clay; sparse phosphate gravel in a few beds. Dominantly sandy beds are tan to white; where clay is a few percent or more, colors of weathered beds are medium to deep red orange, and unweathered beds are light to dark greenish gray. Shells are partly dissolved in most places, and calcite cement is present in some shell beds; epidote, garnet, and feldspar have been removed by weathering to a depth of 12 m, and kaolinite has replaced illite-smectite to an even greater depth. The Archbold Formation reaches an elevation of 64 m on the central ridge, where it is composed mainly of fine to medium sand, but it is typically found at elevations of less than 35 m. The Archbold Formation is as much as 60 m thick on the ridge and it is elsewhere generally less than about 20 m thick. It undonformably overlies the Fruitville, Peace River, and Arcadia Formations, and is unconformably overlain by all younger formations. The age is inferred from fossils in the upper part of the Fruitville pits (bed 1) to be about 1.8-2.0 Ma (Willard and others, 1993). This is also supported by fossils in a thin bed from a core, W-17001, on Archbold Biological Station, and from cuttings from another drillhole outside the map area in Okeechobee County (Lynn Wingard and Harry Dowsett, USGS, oral communication, 1990-1992).

Tf--Fruitville Formation (late Pliocene): quartz sand, clayey and silty in places, and clay beds; local shell beds and phosphate gravel beds; some thin carbonate beds. Epidote and garnet are absent throughout most of the Fruitville Formation except in shell and clay beds; kaolinite replaces illite-smectite to a depth of about 60 m in a core, W-17000, on the central ridge northwest of Lake Placid. Colors range from grayish white in shell beds and black and white in clay beds beneath the lowlands, to tan, pale orange to black in the thick sand on the ridge. The Fruitville Formation on the ridge reaches 35 m elevation; the upper surface is typically 5 to 20 m in the lowlands. The Fruitville Formation overlies an erosional surface on the Peace River Formation and the Arcadia Formation. The maximum thickness, about 70 m, is in the core of the central ridge complex in the map area. The age of the Fruitville Formation is about 2-3.4 Ma, based on fossils in beds 2-10 in the Fruitville pits (Willard and others, 1993; Emslie and Morgan, 1994).

Tp--Peace River Formation (part of the Hawthorn Group of Scott, 1988) (early Pliocene): Quartz and phosphate sand, in most places mixed with abundant silt and clay; thin carbonate beds in some places; shell beds in some places, typically partially dissolved. Clays are mainly magnesian varieties, illite-smectite, palygorskite, and sepiolite; carbonate is typically dolomitic. Colors are mainly medium to dark greenish gray and olive brown. The upper and lower surfaces of the Peace River Formation ar

olive brown. The upper and lower surfaces of the Peace River Formation are unconformities. The Peace River Formation fills deep channels or depressions eroded into the top of the Arcadia Formation, and it is overlain by the Fruitville, Archbold, and Fort Ogden Formations. Erosion of the upper surface has eliminated much of the mineralogic weathering profile such as those present on younger units. The Peace River Formation reaches an elevation of about 20 m in the north-central part of the map area but is lower to the west and south due to erosion. Its maximum thickness in the channels is about 48 m. The age of the Peace River Formation, on the basis of fossils in bed 11 in the APAC pit at Fruitville and a 5.1 Ma 87Sr/86Sr age estimate on a shell from a core, W-12050, located southeast of Arcadia, is early Pliocene.

Ta--Arcadia Formation (part of the Hawthorn Group of Scott, 1988) (early to middle Miocene): Dolomite, limestone, muddy quartz and phosphate sand, clay beds; some shell beds, some phosphate pebble beds. Shell beds are typically leached, molds and casts, very hard, or chalky, fine-grained, without recognizible macrofossils. Epidote, garnet, and illite-smectite are present throughout the Arcadia; the mineralogic profiling used to determine relative age in younger surficial deposits cannot be applied to the Arcadia Formation because the clay and carbonate content has greatly reduced the influx of oxygenated, acidic rain water, and also because the upper part of the Arcadia has been eroded. Colors range from white in the chalky beds to tan or gray in the beds in which only impressions of shells remain, and green and gray in the clay-rich zones. The elevation of the eroded surface is highest in the north central part of the map area, about 10 m, and lower to the west, south, and east. The Arcadia Formation underlies the whole area but the cross sections do not portray the entire thickness. Scott (1988) indicates a maximum thickness of about 150 m in the southwest part of the Arcadia Quadrangle.

QTe--Windborne sand (late Pliocene to middle Pleistocene): Well-sorted to moderately-sorted fine to medium quartz sand, little or no silt or clay. Up to 15 m thick in some places but typically less than 4 m thick. Found in large sheets and small patches over much of the central and northeastern parts of the map area; absent over most of the Fort Ogden and Fort Thompson Formations. White to tan; epidote and garnet typically absent; clay is both illite-smectite (windborne, detrital) and kaolinite (weathering product). Age ranges from about 2 Ma to the age of the Fort Ogden (1.25 Ma to 450 Ka).

GEOLOGIC MAP OF THE SARASOTA, FLORIDA 30 X 60-MINUTE QUADRANGLE

by

Lucy McCartan[1] and Wai-See Moy[2]

1995

[1]Geology by Lucy McCartan [2] Digitial Cartography by Wai-See Moy

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards. (or with the North American Stratigraphic Code) Any use of trade names is for descriptive purposes only and does not imply endorsement by the U.S. Government