

U.S. Department of the Interior
National Park Service
Natural Resource Stewardship and Science Directorate
Geologic Resources Division



Biscayne National Park

GRI Ancillary Map Information Document

Produced to accompany the Geologic Resources Inventory (GRI) Digital Geologic Data for Biscayne National Park

bisc_geology.pdf

Version: 8/6/2021

Geologic Resources Inventory Map Document for Biscayne National Park

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Geologic Resources Inventory Map Document



Biscayne National Park, Florida

Document to Accompany Digital Geologic-GIS Data

[bisc_geology.pdf](#)

Version: 8/6/2021

This document has been developed to accompany the digital geologic-GIS data developed by the Geologic Resources Inventory (GRI) program for Biscayne National Park, Florida (BISC).

Attempts have been made to reproduce all aspects of the original source products, including the geologic units and their descriptions, geologic cross sections, the geologic report, references and all other pertinent images and information contained in the original publication.

This document contains the following information:

- 1) **About the NPS Geologic Resources Inventory Program** – A brief summary of the Geologic Resources Inventory (GRI) Program and its products. Included are web links to the GRI GIS data model, and to the GRI products page where digital geologic-GIS datasets, scoping reports and geology reports are available for download. In addition, web links to the NPS Data Store and GRI program home page, as well as contact information for the GRI coordinator, are also present.
- 2) **GRI Digital Maps and Source Citations** – A listing of all GRI digital geologic-GIS maps produced for this project along with sources used in their completion. In addition, a brief explanation of how each source map was used is provided.
- 3) **Digital Geologic-GIS Map of Biscayne National Park and Vicinity, Florida**
 - 3a) **Geologic Map Unit List** – A listing of all geologic map units present on the geologic map.
 - 3b) **Geologic Map Unit Descriptions** – Descriptions for all geologic map units present on the geologic map.
 - 3c) **Geologic Cross Sections** – Geologic cross section graphics for all cross section lines present on the geologic map.
- 4) **Digital Benthic-GIS Map of the eastern portions of Florida Bay (1991-1995 Substrate), Florida**
 - 4a) **Benthic Habitat Map Unit List** – A listing of all benthic habitat map units present on the benthic habit map.
 - 4b) **Benthic Habitat Map Unit Descriptions** – Descriptions for all benthic habitat map units present on the benthic habit map.

5) **Ancillary Source Map Information** – Additional source map information presented by source map. In many cases a link or links to the source map publication site, as well as the National Geologic Map Database (NGMDB) site for the source map is presented.

6) **GRI Digital Data Credits** – GRI digital geologic-GIS data and ancillary map information document production credits.

For information about using GRI digital geologic-GIS data contact:

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About the NPS Geologic Resources Inventory Program

Background

The Geologic Resources Inventory (GRI) provides geologic map data and pertinent geologic information to support resource management and science-informed decision making in more than 270 natural resource parks throughout the National Park System. Geologic resources for management consideration include both the processes that act upon the Earth and the features formed as a result of these processes. Geologic processes include: erosion and sedimentation; seismic, volcanic, and geothermal activity; glaciation, rockfalls, landslides, and shoreline change. Geologic features include mountains, canyons, natural arches and bridges, minerals, rocks, fossils, cave and karst systems, beaches, dunes, glaciers, volcanoes, and faults.

The GRI is one of 12 inventories funded by the National Park Service (NPS) Inventory and Monitoring Program. The Geologic Resources Division of the NPS Natural Resource Stewardship and Science Directorate administers the GRI. The NPS Geologic Resources Division partners with the Colorado State University Department of Geosciences to produce GRI products. Many additional partners participate in the GRI process by contributing source maps or reviewing products.

The GRI team undertakes three tasks for each park in the Inventory and Monitoring program: (1) conduct a scoping meeting and provide a summary document, (2) provide digital geologic map data in a geographic information system (GIS) format, and (3) provide a GRI report. These products are designed and written for nongeoscientists.

Products

Scoping Meetings: These park-specific meetings bring together local geologic experts and park staff to inventory and review available geologic data and discuss geologic resource management issues. A summary document is prepared for each meeting that identifies a plan to provide digital map data for the park.

Digital Geologic Maps: Digital geologic maps reproduce all aspects of traditional paper maps, including notes, legend, and cross sections. Bedrock, surficial, and special purpose maps such as coastal or geologic hazard maps may be used by the GRI to create digital Geographic Information Systems (GIS) data and meet park needs. These digital GIS data allow geologic information to be easily viewed and analyzed in conjunction with a wide range of other resource management information data.

For detailed information regarding GIS parameters such as data attribute field definitions, attribute field codes, value definitions, and rules that govern relationships found in the data, refer to the NPS Geology-GIS Data Model document available at: <https://www.nps.gov/articles/gri-geodatabase-model.htm>

Geologic Reports: GRI reports synthesize discussions from the original scoping meeting, follow up conference call(s), and subsequent research. Chapters of each report discuss the geologic setting of the park, distinctive geologic features and processes within the park, highlight geologic issues facing resource managers, and describe the geologic history leading to the present-day landscape. Each report also includes a poster illustrating these GRI digital geologic-GIS data.

For a complete listing of GRI products visit the GRI publications webpage: <https://go.nps.gov/gripubs>. GRI digital geologic-GIS data is also available online at the NPS Data Store: <https://irma.nps.gov/DataStore/Search/Quick>. To find GRI data for a specific park or parks select the appropriate park(s), enter "GRI" as a Search Text term, and then select the Search button.

For more information about the Geologic Resources Inventory Program visit the GRI webpage: <https://www.nps.gov/subjects/geology/gri.htm>. At the bottom of that webpage is a "Contact Us" link if you need additional information. You may also directly contact the program coordinator:

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The Geologic Resources Inventory (GRI) program is funded by the National Park Service (NPS) Inventory and Monitoring (I&M) Division. Learn more about I&M and the 12 baseline inventories at the I&M webpage: <https://www.nps.gov/im/inventories.htm>.

GRI Digital Maps and Source Map Citations

The GRI digital geologic-GIS maps for Biscayne National Park, Florida (BISC):

Digital Geologic-GIS Map of Biscayne National Park and Vicinity, Florida (*GRI MapCode BISC*)

The following sources were used to produce the above GRI digital geologic-GIS map.

Geologic units and their related contacts were produced from the following source:

Scott, Thomas M., 2001, Geologic Formations of Florida (digital): Florida Geological Survey, Open-File Report 80, scale 1:126,720 ([Geologic Formations of Florida](#)). (*GRI Source Map ID 3682*).

Surficial sediment units and their related contacts were produced from the following sources:

Green, Richard, Campbell, Ken, and Scott, Tom, 1996, Surficial and Bedrock Geology of the western portion of the USGS 1:100,000 scale Homestead Quadrangle: Florida Geological Survey, Open File Map Series 83/08-12, scale 1:100,000. ([Homestead \(western portion\) 1:100,000 scale Quadrangle \(Surficial and Bedrock Geology\)](#)) (*GRI Source Map ID 2424*).

Green, Richard, Campbell, Ken, and Scott, Tom, 1995, Surficial and Bedrock Geology of the eastern portion of the USGS 1:100,000 scale Homestead Quadrangle: Florida Geological Survey, Open File Map Series 83/01-07, scale 1:100,000 ([Homestead \(eastern portion\) 1:100,000 scale Quadrangle \(Surficial and Bedrock Geology\)](#)). (*GRI Source Map ID 4983*).

Image 2 (Surficial Sediments) from each source map was used.

Geologic cross section lines were produced from the following sources (listed below), as well as from the Green et al., 1995 source map listed above as a source for surficial sediment units and contacts.

Causaras, C.R., 1986, Geology of the Surficial Aquifer System, Dade County, Florida: U.S. Geological Survey, Water-Resources Investigations Report 86, scale 1:136,000 ([Surficial Aquifer System \(Dade County\)](#)). (*GRI Source Map ID 3056*).

Reese, R.S., and Cunningham, K.J., 2000, Hydrogeology of the Gray Limestone Aquifer in southern Florida: U.S. Geological Survey, Water-Resources Investigations Report 99-4213, scale 1:675,000 ([Hydrogeology of the Gray Limestone Aquifer](#)). (*GRI Source Map ID 5320*).

Mine point features were produced from the Green, Richard, Campbell, Ken, and Scott, Tom, 1995 source map listed above with sources for geologic cross section lines.

Digital Benthic Habitat-GIS Map of the eastern portions of Florida Bay (1991-1995 Substrate), Florida (*GRI MapCode BISC_benthic_habitat*)

Benthic habitat units and their related contacts were produced from the following source:

Florida Fish and Wildlife Commission Florida Marine Research Center, 1999, Benthic Habitats of Florida Bay, Florida 1991-1995, CD-ROM: National Oceanic and Atmospheric Administration Coastal Services Center, unpublished digital data, scale 1:48,000 ([Benthic Habitats of Florida Bay](#)). (*GRI Source Map ID 5046*).

Digital Geohazards-GIS Map of Biscayne National Park and Vicinity (2005 Mapping), Florida (*GRI MapCode BISC_geohazard*)

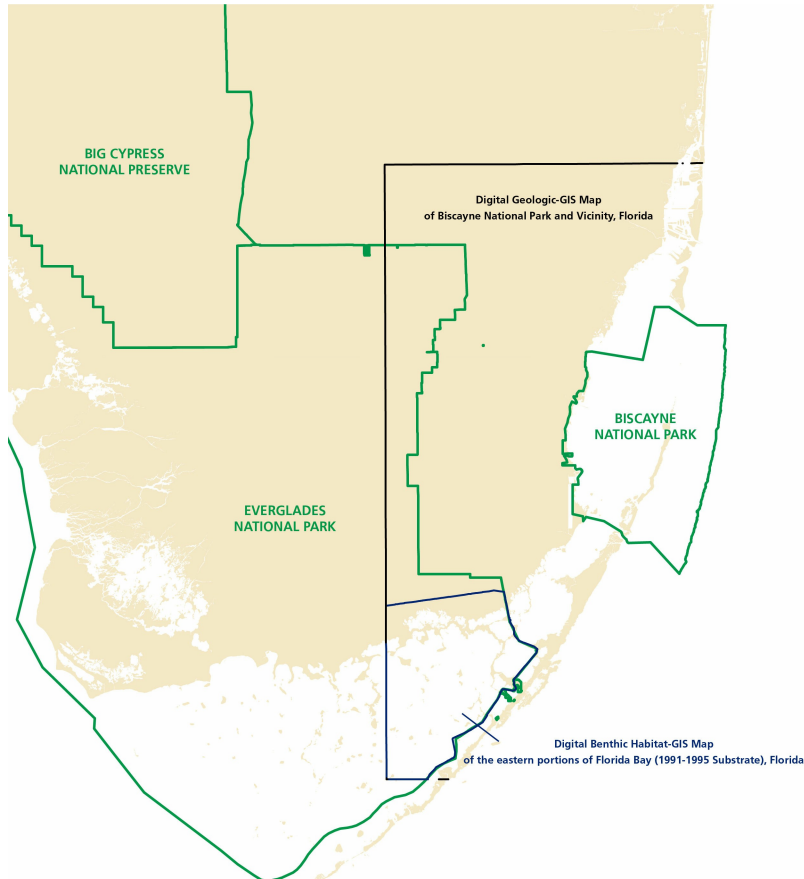
Hazard area features (sink holes) and their related contacts were produced from the following source:

Arthur, J.D., Baker, A.E., Cichon, J.R., Wood, A.R., and Rudin, A., 2005, Florida Aquifer Vulnerability Assessment (FAVA): Contamination Potential of Florida's Principal Aquifer Systems: Florida Geological Survey, Bulletin [in review], scale 1:24,000 ([Florida Aquifer Vulnerability Assessment \(2005\)](#)). (*GRI Source Map ID 6921*).

Additional information pertaining to each source map is also presented in the GRI Source Map Information (BISCMAP) table included with the GRI digital geologic-GIS data.

Index Map

The following index map displays the extents of the GRI digital geologic-GIS maps produced for Biscayne National Park (BISC). The boundary for Biscayne National Park, as well as for Big Cypress National Preserve (BICY) and Everglades National Preserve (EVER) (all as of July, 2021) are outlined in green. The extent of the land area of GRI Digital Geologic-GIS Map of Biscayne National Park and Vicinity, Florida is outlined in black, whereas the extent of the GRI Digital Benthic Habitat-GIS Map of the eastern portions of Florida Bay (1991-1995 Substrate), Florida is outlined in navy blue. The extent of hazard sink holes, as of 2005, present in the GRI Digital Geohazards-GIS Map of Biscayne National Park and Vicinity (2005 Mapping), Florida, shares the extent of the geologic-GIS map.



Index map by Stephanie O'Meara (Colorado State University).

Digital Geologic-GIS Map of Biscayne National Park and Vicinity, Florida

The geologic unit and surficial sediment unit listing, descriptions for these units, and geologic cross section graphics associated with the GRI Digital Geologic-GIS Map of Biscayne National Park and Vicinity, Florida are presented below.

Geologic Map Unit List

The surficial sediment and geologic units present in the GRI Digital Geologic-GIS Map of Biscayne National Park and Vicinity, Florida are listed below. Units are listed with their assigned unit symbol and unit name (e.g., d - Disturbed by human activity). Units are generally listed from youngest to oldest. No description for water is provided. Information about each geologic unit is also presented in the GRI Geologic Unit Information (BISCUNIT) table included with the GRI digital geologic-GIS data.

Cenozoic Era

Quaternary Period

Holocene Epoch

[d](#) - Disturbed by human activity

[sm](#) - Thin soil over Miami Limestone

[sk](#) - Thin soil over Key Largo Limestone

[ma](#) - Marl

[mp](#) - Marl underlain by peat

[mu](#) - Muck

[cm](#) - Carbonate mud

[Qh](#) - Holocene sediments

Pleistocene Period

[Qm](#) - Miami Limestone

[Qk](#) - Key Largo Limestone

Geologic Map Unit Descriptions

Descriptions of all geologic and surficial sediment map units are presented below.

d - Disturbed by human activity (Recent)

No additional description present on source map. Unit present on source map: [Homestead \(eastern portion\) 1:100,000 scale Quadrangle \(Surficial and Bedrock Geology\)](#)

sm - Thin soil over Miami Limestone (Holocene)

Thin soil over Miami Limestone

The area mapped as thin soil over Miami Limestone covers much of the northern one-quarter of the map. Here, approximately 30 centimeters of soil lie directly on the Miami Limestone. The surface of the Miami Limestone in this region is quite irregular due to micro-karst development; limestone is exposed in limited areas. As a result of the irregularities, pieces of limestone are commonly seen in plowed fields. Description from source map: [Homestead \(eastern portion\) 1:100,000 scale Quadrangle \(Surficial and Bedrock Geology\)](#)

Thin soil over Miami Limestone

The area mapped as thin soil over Miami Limestone covers much of the area of the Everglades National Park known as the Pinelands, in the northeastern corner of the map. The surface of the Miami Limestone in this region is quite irregular due to micro-karst development. The Miami Limestone is often exposed in this area. Where limestone is not exposed, up to approximately 30 centimeters of sediment may be present. Description from source map: [Homestead \(western portion\) 1:100,000 scale Quadrangle \(Surficial and Bedrock\)](#)

sk - Thin soil over Key Largo Limestone (Holocene)

The map area showing thin soil over Key Largo Limestone is similar to the area discussed above. A thin soil has developed directly on the Key Largo Limestone. In general, the soil is 15 to 30 centimeters deep, with limestone exposed in limited areas. This map area forms the higher portions of the keys. Description from source map: [Homestead \(eastern portion\) 1:100,000 scale Quadrangle \(Surficial and Bedrock Geology\)](#)

ma - Marl (Holocene)**Marl**

Surrounding the areas where Miami Limestone is covered by a thin veneer of soil, a marl of variable thickness, ranging from less than 50 centimeters to more than one meter, lies on the limestone. The marl, which is of fresh water origin, grades laterally into mucks (organic-rich sediments with variable clay and carbonate contents) and then marine carbonate muds and marls. Description from source map: [Homestead \(eastern portion\) 1:100,000 scale Quadrangle \(Surficial and Bedrock Geology\)](#)

mp - Marl underlain by peat (Holocene)**Marl underlain by peat**

Marl underlain by peat occurs between the areas mapped as marl and those areas mapped as muck. This area was delineated from the 1958 soils map (Leighty and Henderson, 1958). Limestone underlies this map unit at depths exceeding 60 centimeters. Description from source map: [Homestead \(eastern portion\) 1:100,000 scale Quadrangle \(Surficial and Bedrock Geology\)](#)

mu - Muck (Holocene)**Muck**

Muck lies on the Miami Limestone along the coast and inland along many of the drainage areas; mangroves commonly grow in this area. The muck contains varying percentages of organic matter, carbonate mud and marl, and other non-organic components. The contact between the muck and the carbonate mud is speculative and based on limited data. Description from source map: [Homestead \(eastern portion\) 1:100,000 scale Quadrangle \(Surficial and Bedrock Geology\)](#)

Muck

Muck lies on the Miami Limestone along the coast and inland along many of the drainage areas; mangroves commonly grow in this area. The muck contains varying percentages of organic matter, carbonate mud and marl, and minor siliciclastic components. The contact between the muck and the carbonate mud is based on Leighty and Henderson, (1958), Craighead, (1971), and USGS 7.5 minute orthophoto quadrangles. Description from source map: [Homestead \(western portion\) 1:100,000 scale](#)

[Quadrangle \(Surficial and Bedrock\)](#)

cm - Carbonate mud (Holocene)

Carbonate mud

Carbonate mud forms the islands within Florida Bay and occurs along both the bay side and ocean side of Key Largo. Probe data indicates that these carbonate muds may exceed 2.5 meters in thickness. The surface of the exposed carbonate muds are often vegetated by abundant mangroves. A muck component may also be present in these areas. Description from source map: [Homestead \(eastern portion\) 1:100,000 scale Quadrangle \(Surficial and Bedrock Geology\)](#)

Carbonate mud

Carbonate mud forms the islands within Florida Bay. There is an area of carbonate mud mapped along the southern edge of the mainland in the study area. The mud forms an embankment which is from one to two feet higher than the surrounding muck and marl. Craighead (1971) stated that this embankment is derived from Florida Bay mud which has been deposited by storms. In the southeastern part of the map area, this has been called the Buttonwood embankment, whereas in the southwestern part of the study area, the mud forms the Flamingo embankment (Craighead, 1971). Probe data indicates that these carbonate muds may exceed three meters in thickness. The surface of the exposed carbonate muds are often vegetated by abundant mangroves. A muck component may also be present in these areas. Description from source map: [Homestead \(western portion\) 1:100,000 scale Quadrangle \(Surficial and Bedrock\)](#)

Qh - Holocene sediments (Holocene)

The Holocene sediments in Florida occur near the present coastline at elevations generally less than 5 feet (1.5 meters). The sediments include quartz sands, carbonate sands and muds, and organics. Description from source map: [Geologic Formations of Florida](#)

Qm - Miami Limestone (Pleistocene)

The Miami Limestone (formerly the Miami Oolite), named by Sanford (1909), occurs at or near the surface in southeastern peninsular Florida from Palm Beach County to Dade and Monroe Counties. It forms the Atlantic Coastal Ridge and extends beneath the Everglades where it is commonly covered by thin organic and freshwater sediments. The Miami Limestone occurs on the mainland and in the southern Florida Keys from Big Pine Key to the Marquesas Keys. From Big Pine Key to the mainland, the Miami Limestone is replaced by the Key Largo Limestone. To the north, in Palm Beach County, the Miami Limestone grades laterally northward into the Anastasia Formation.

The Miami Limestone consists of two facies, an oolitic facies and a bryozoan facies (Hoffmeister *et al.* [1967]). The oolitic facies consists of white to orangish gray, poorly to moderately indurated, sandy, oolitic limestone (grainstone) with scattered concentrations of fossils. The bryozoan facies consists of white to orangish gray, poorly to well indurated, sandy, fossiliferous limestone (grainstone and packstone). Beds of quartz sand are also present as unindurated sediments and indurated limey sandstones. Fossils present include mollusks, bryozoans, and corals. Molds and casts of fossils are common. The highly porous and permeable Miami Limestone forms much of the Biscayne Aquifer of the surficial aquifer system.

Description from source map: [Geologic Formations of Florida](#)

Qk - Key Largo Limestone (Pleistocene)

The Key Largo Limestone, named by Sanford (1909), is exposed at the surface in the Florida Keys from Soldier Key on the northeast to Newfound Harbor Keys near Big Pine Key on the southwest (Hoffmeister, 1974). This unit is a fossil coral reef much like the present day reefs offshore from the Keys. An exceptional exposure of the Key Largo Limestone occurs in the Windley Key Quarry State Geological Site in the upper Florida Keys. Exposures of the limestone containing large coral heads are in a series of old quarries.

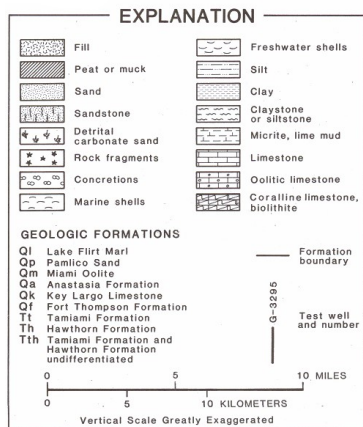
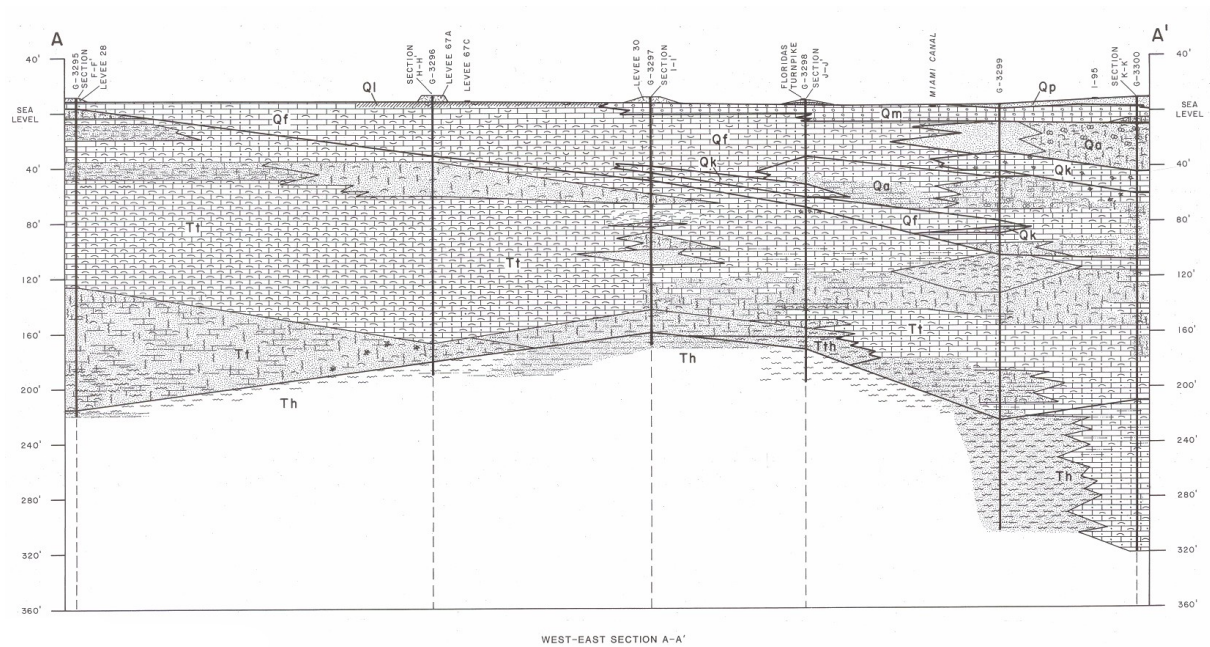
The Key Largo Limestone is a white to light gray, moderately to well indurated, fossiliferous, coralline limestone composed of coral heads encased in a calcarenitic matrix. Little to no siliciclastic sediment is found in these sediments. Fossils present include corals, mollusks and bryozoans. It is highly porous and permeable and is part of the Biscayne Aquifer of the surficial aquifer system.

Description from source map: [Geologic Formations of Florida](#)

Geologic Cross Sections

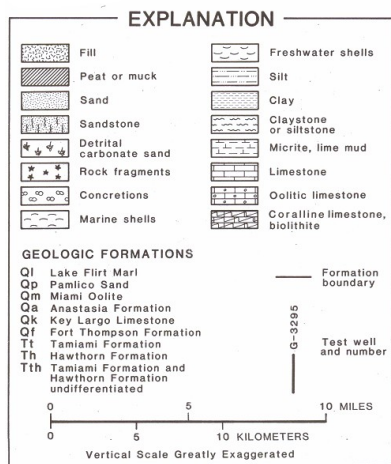
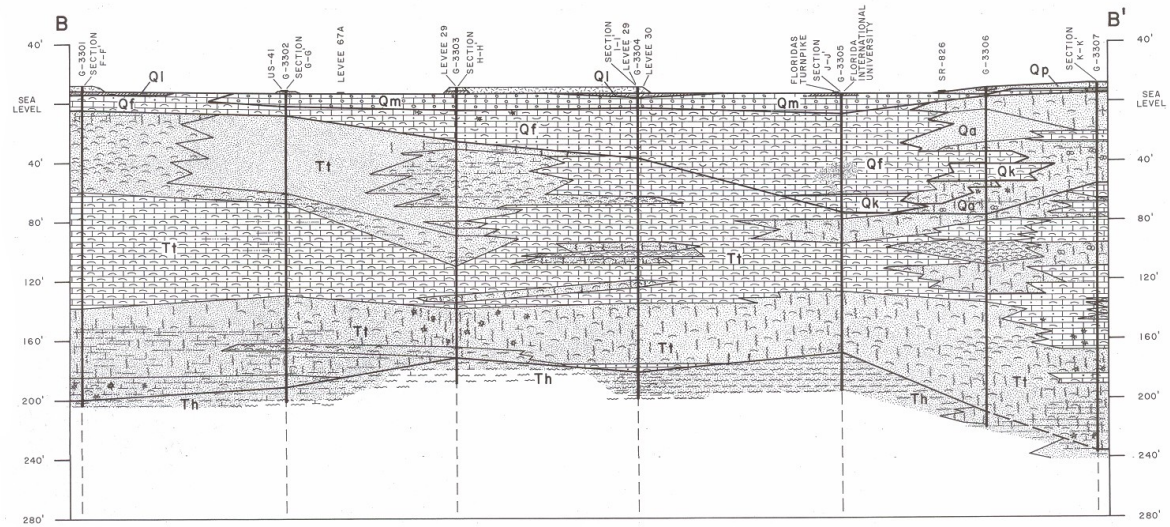
The geologic cross sections present in the GRI digital geologic-GIS data produced for Biscayne National Park, Florida (BISC) are presented on the following pages. Note that most cross section abbreviations (e.g., A - A') have been changed from their source map abbreviation in the GRI digital geologic-GIS data so that each cross section abbreviation in the GRI data is unique. Cross section graphics were scanned at a high resolution and can be viewed in more detail by zooming in (if viewing the digital format of this document).

Cross Section A-A'



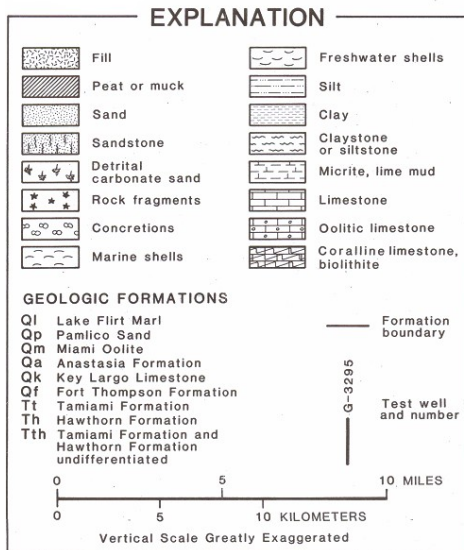
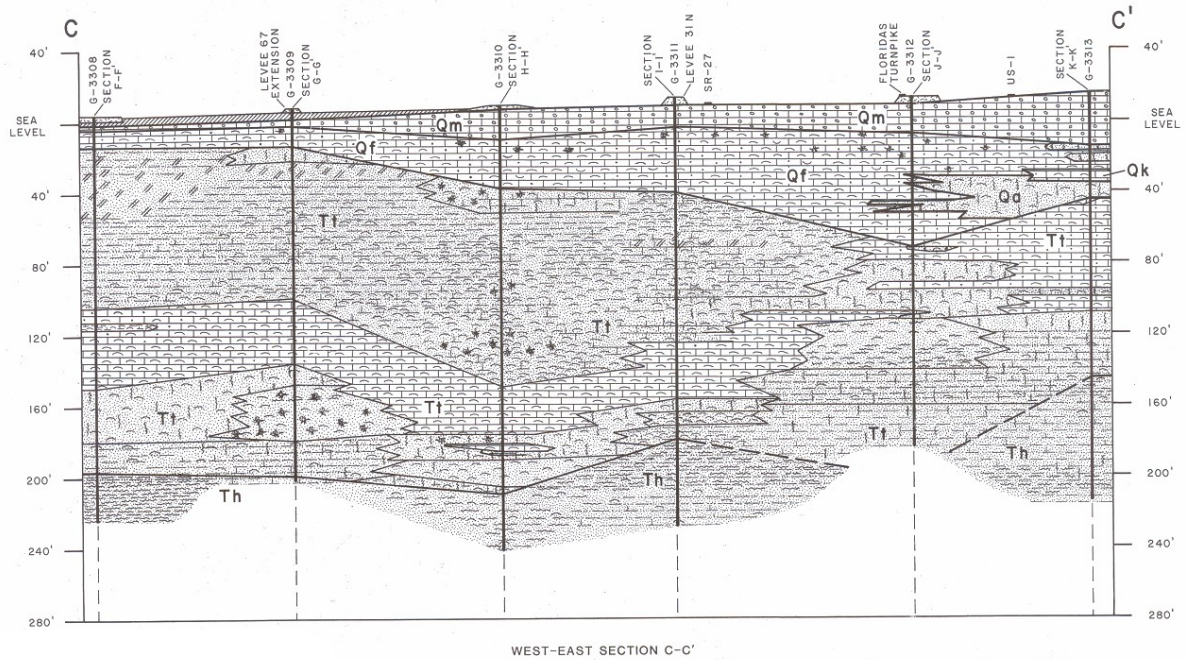
Graphic from source map: [Surficial Aquifer System \(Dade County\)](#).

Cross Section B-B'



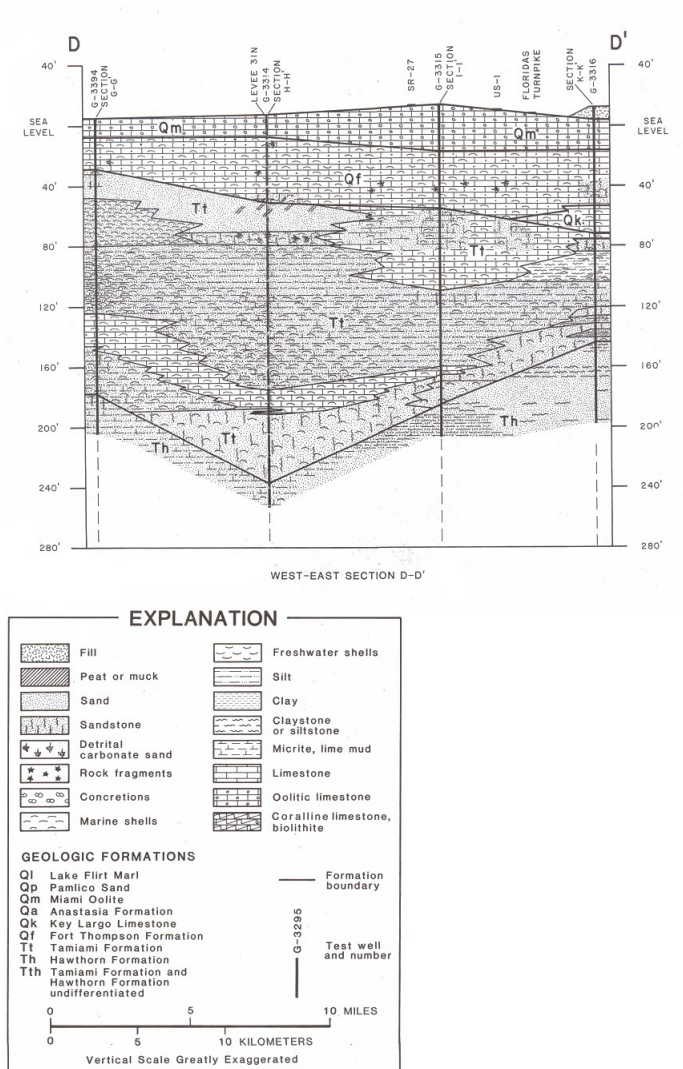
Graphic from source map: [Surficial Aquifer System \(Dade County\)](#).

Cross Section C-C'



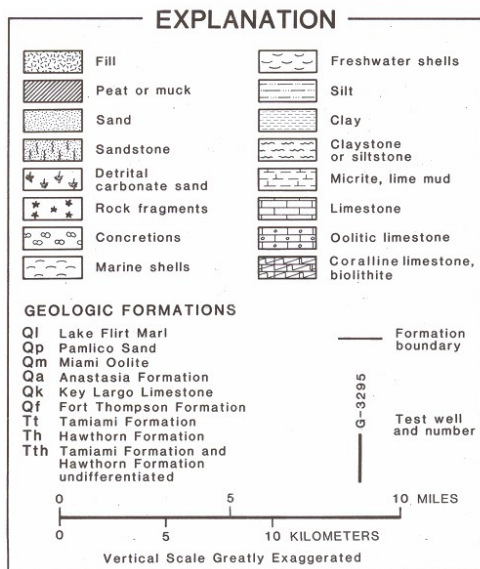
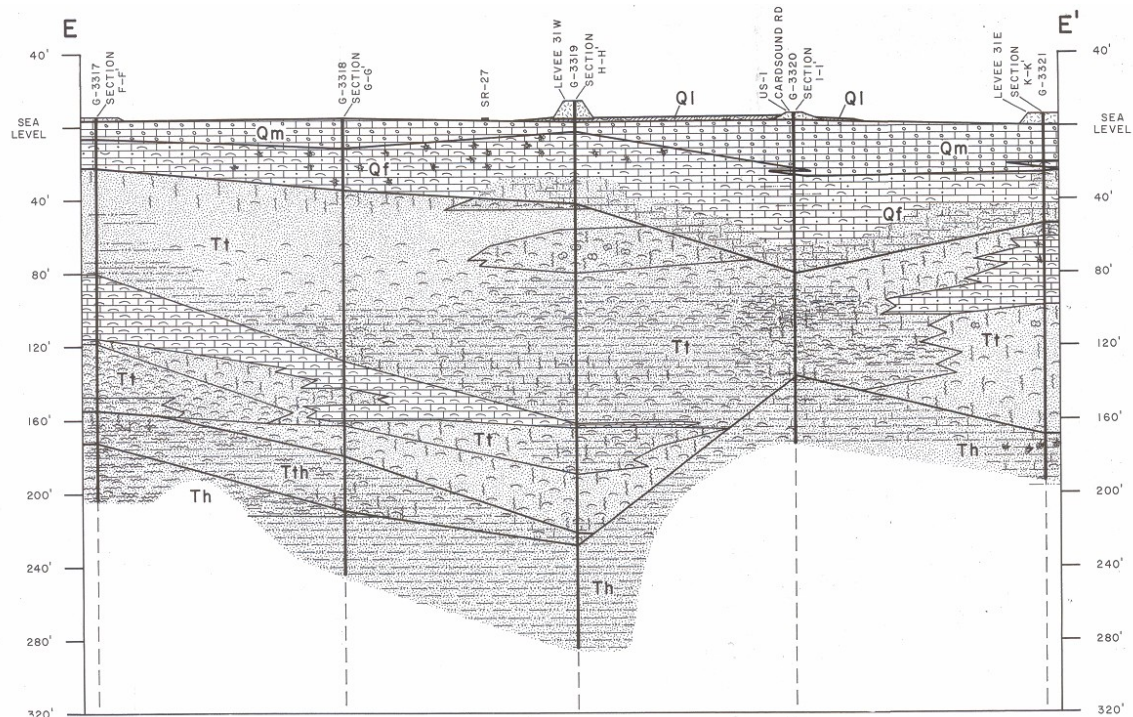
Graphic from source map: [Surficial Aquifer System \(Dade County\)](#).

Cross Section D-D'



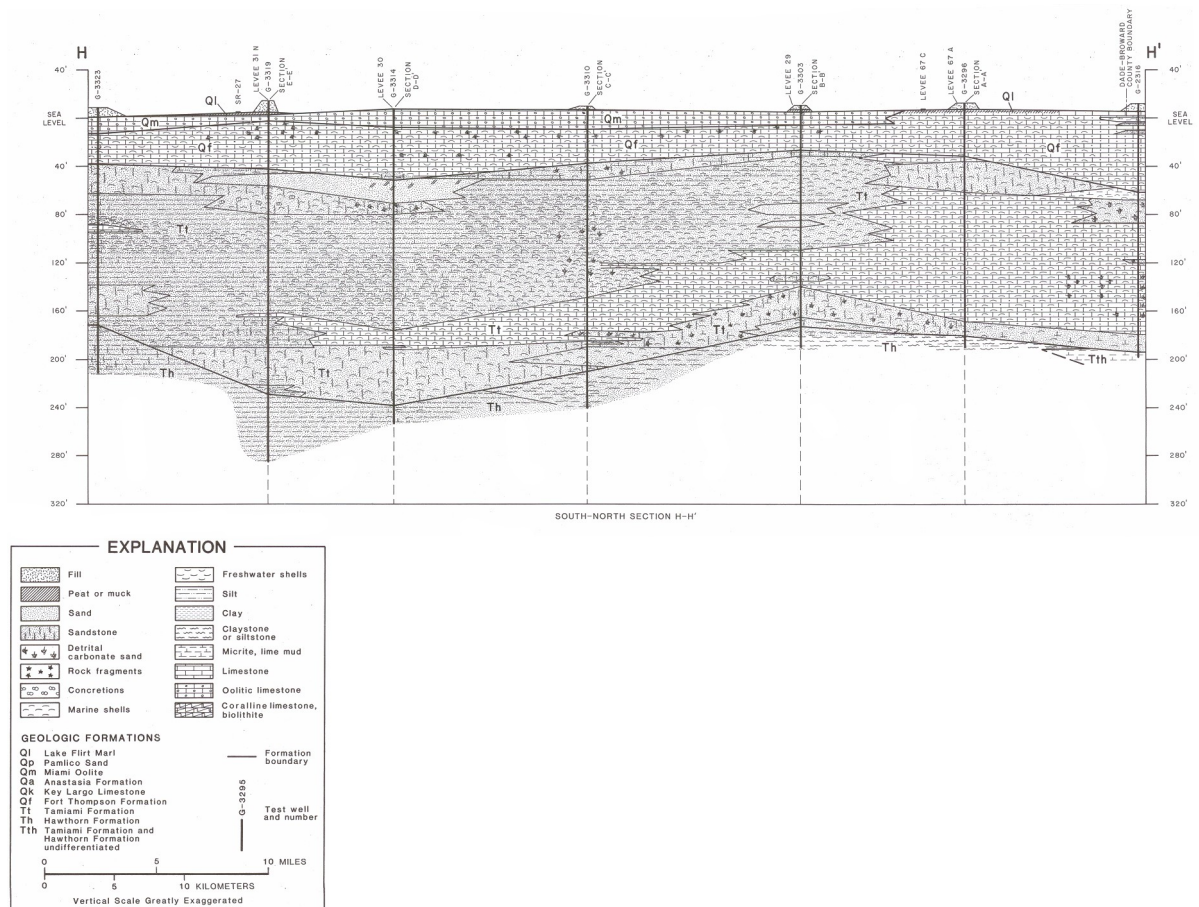
Graphic from source map: [Surficial Aquifer System \(Dade County\)](#).

Cross Section E-E'



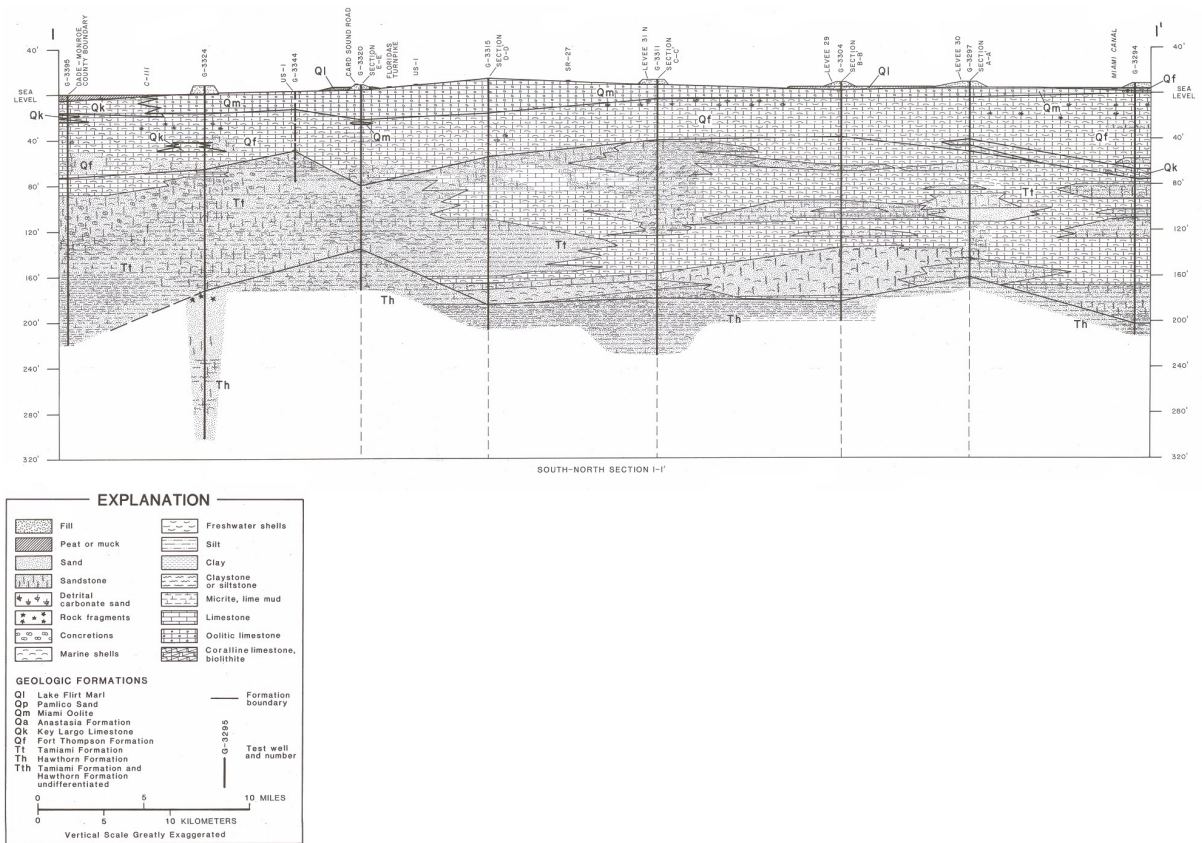
Graphic from source map: [Surficial Aquifer System \(Dade County\)](#).

Cross Section F-F'



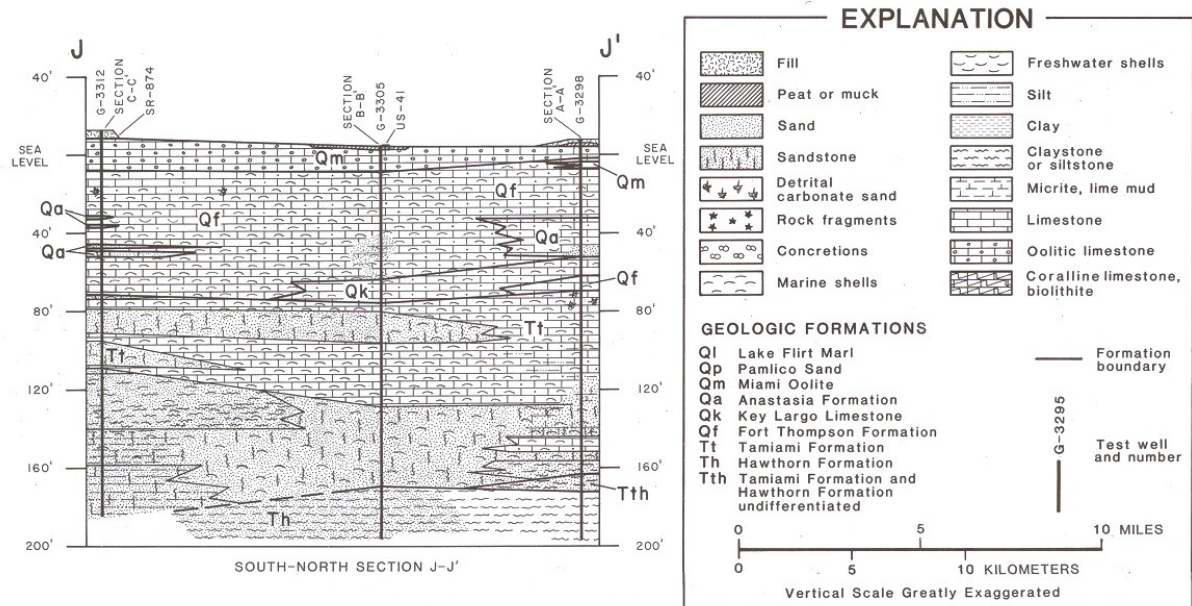
Graphic from source map: [Surficial Aquifer System \(Dade County\)](#). Cross section H-H' on source map.

Cross Section G-G'



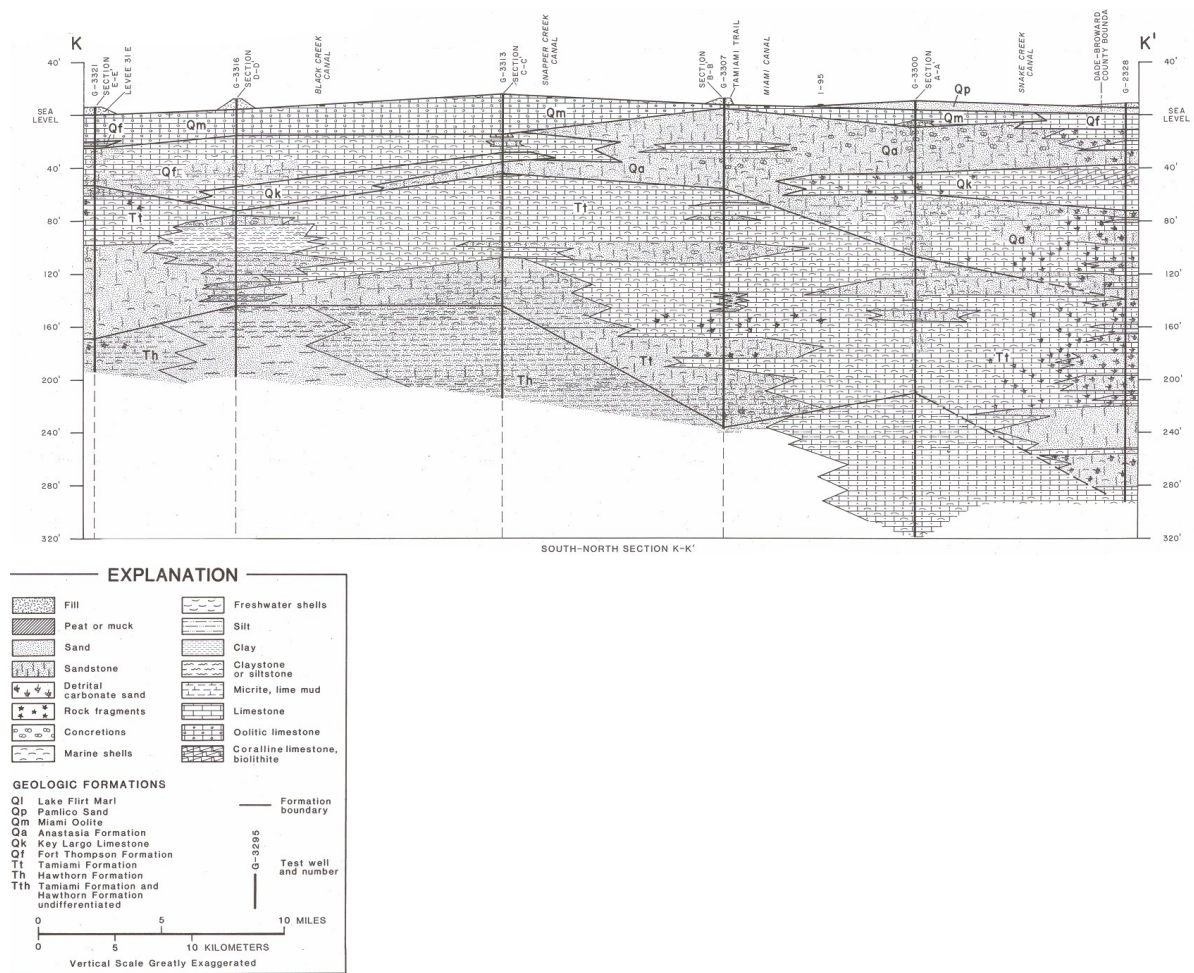
Graphic from source map: [Surficial Aquifer System \(Dade County\)](#). Cross section I-I' on source map.

Cross Section H-H'



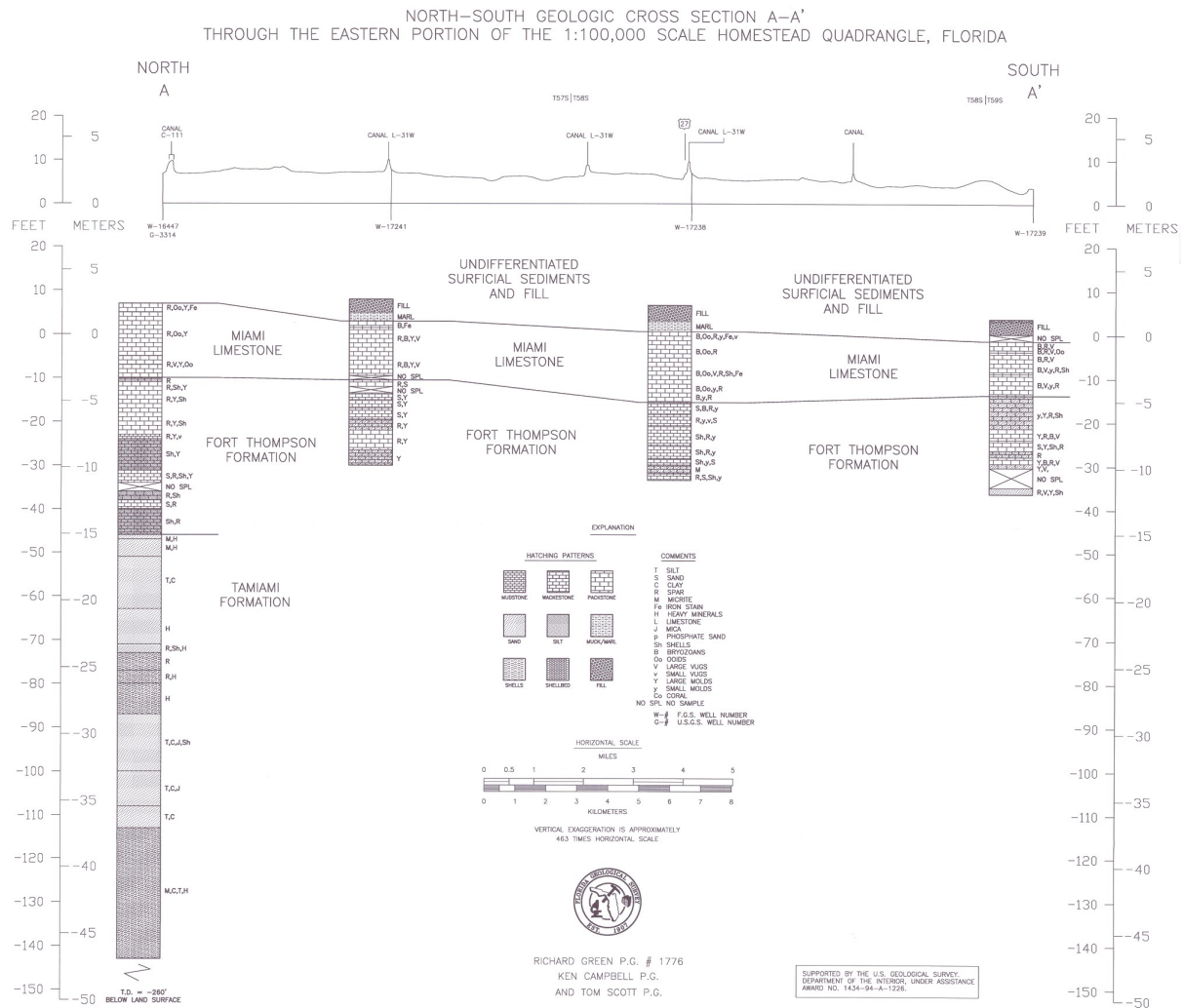
Graphic from source map: [Surficial Aquifer System \(Dade County\)](#). Cross section J-J' on source map.

Cross Section I-I'



Graphic from source map: [Surficial Aquifer System \(Dade County\)](#). Cross section K-K' on source map.

Cross Section J-J'



Graphic from source map: [Homestead \(eastern portion\) 1:100,000 scale Quadrangle \(Surficial and Bedrock Geology\)](#). Cross section A-A' on source map.

[illegible]

Graphic from source map: [Homestead \(eastern portion\) 1:100,000 scale Quadrangle \(Surficial and Bedrock Geology\)](#). Cross section B-B' on source map.

NORTH **SOUTH**

C **C'**

THROUGH THE EASTERN PORTION OF THE 1:100,000 SCALE HOMESTEAD QUADRANGLE, FLORIDA

Geological Features and Formations:

- UNDIFFERENTIATED SURFICIAL SEDIMENTS AND FILL
- MIAMI LIMESTONE
- KEY LARGO LIMESTONE
- FORT THOMPSON FORMATION
- TAMIAMI FORMATION

Legend:

HATCHING PATTERNS:

- Mudstone
- Sand
- Shells
- Wackestone
- Silt
- Shelled
- Rockstone
- Mud/marl
- Fill

COMMENTS:

- T SILT
- S SAND
- C CLAY
- R GRAPE
- M MORTRE
- FA IRON STAIN
- H HEAVY MINERALS
- L LIMESTONE
- P PHOSPHATE SAND
- SH SHELLS
- B BRIOZOANS
- OV OOLITE
- V LARGE VUGS
- Y SMALL VUGS
- Y LARGE MOLDIS
- Y SMALL MOLDIS
- CO CORAL
- NO SPL NO SAMPLE

Geologists Logs Used for These Wells and Samples Available for Inspection:

W-# F.G.S. WELL NUMBER
G-# U.S.G.S. WELL NUMBER

Horizontal Scale:

0 0.5 1 2 3 4 5 MILES
0 1 2 3 4 5 6 7 8 KILOMETERS

Vertical Exaggeration:

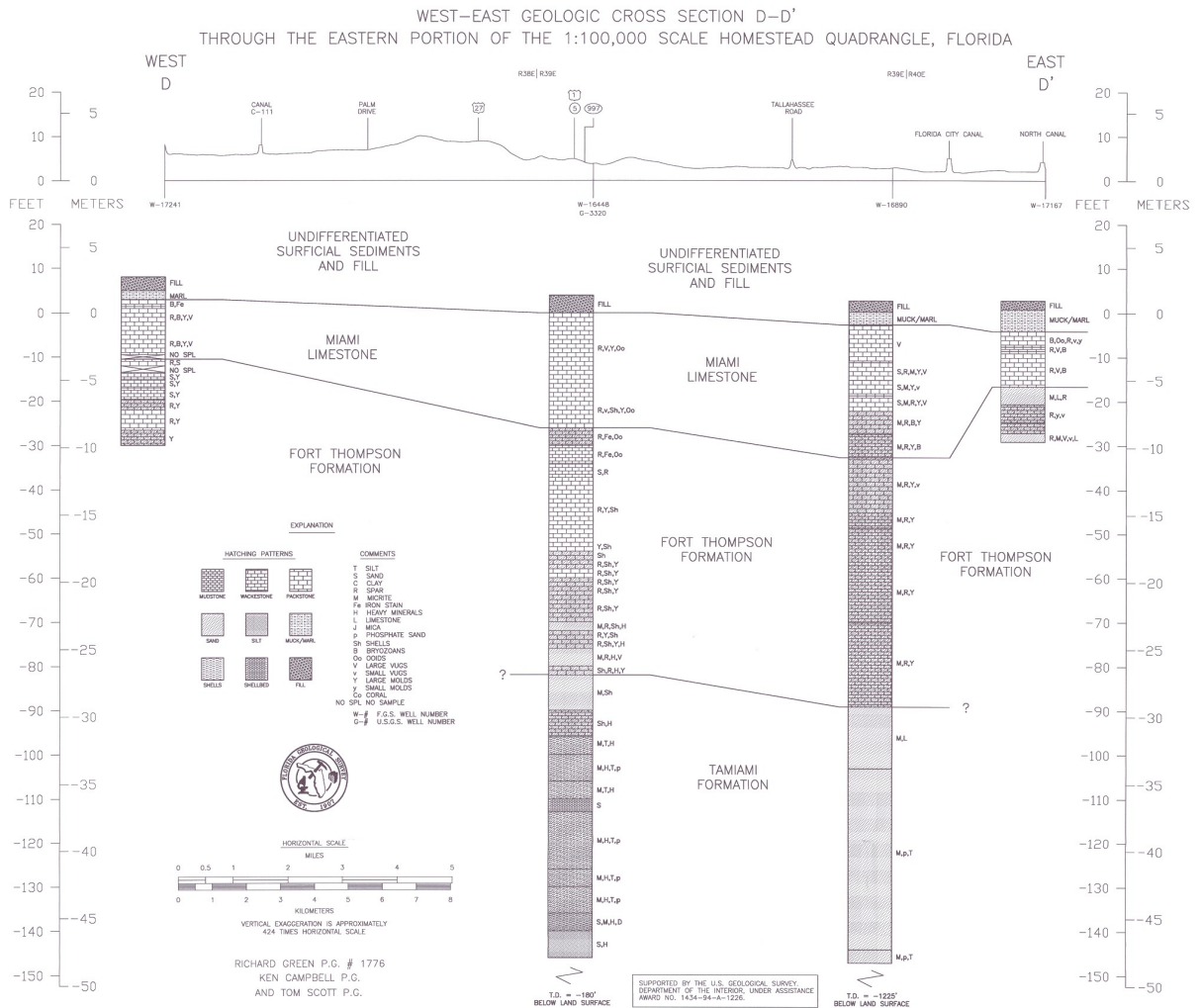
453 TIMES HORIZONTAL SCALE

Support:

SUPPORTED BY THE U.S. GEOLOGICAL SURVEY, DEPARTMENT OF THE INTERIOR, UNDER ASSISTANCE AWARD NO. 1434-94-A-1226.

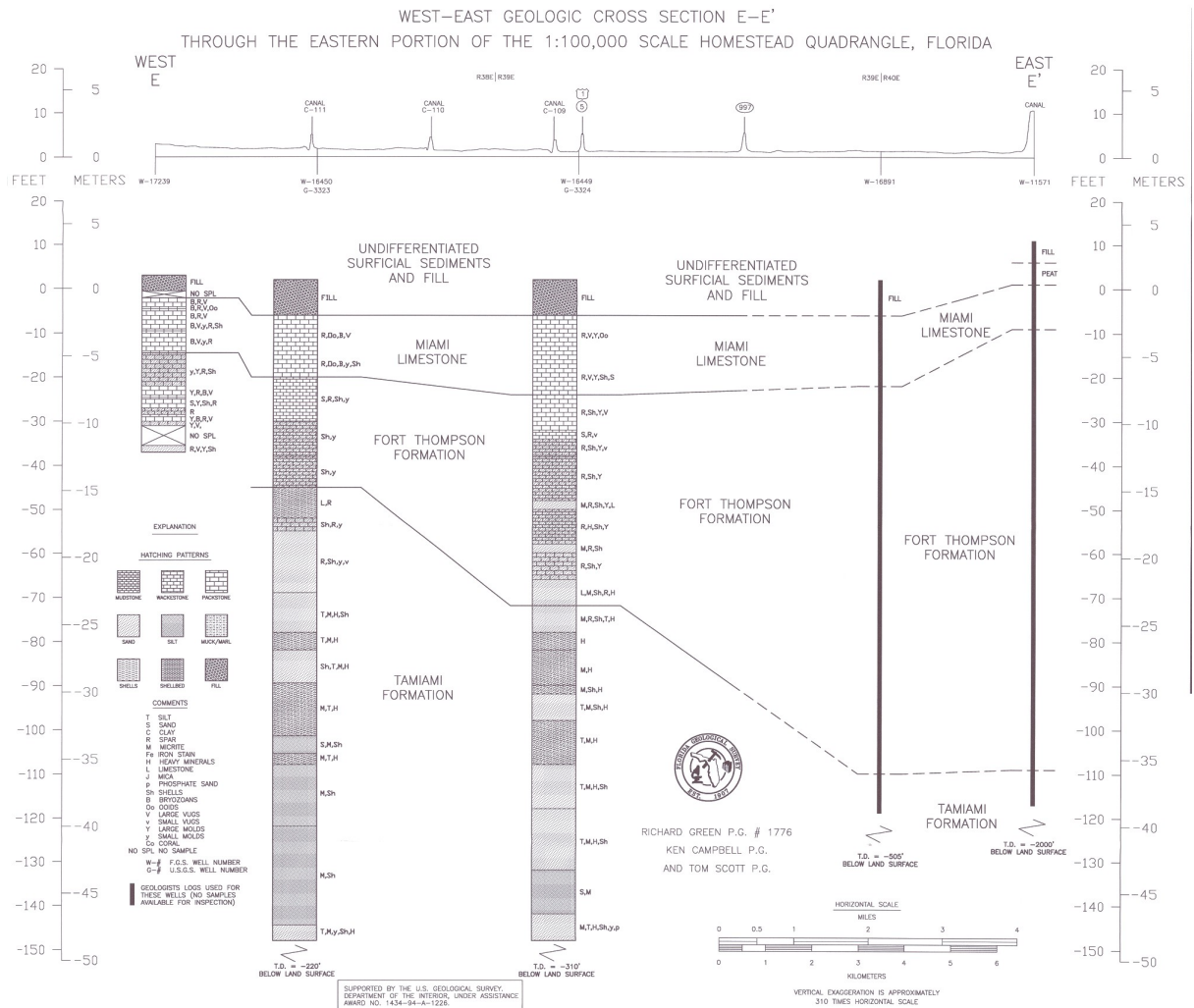
2021 NPS Geologic Resources Inventory Program

Cross Section M-M'



Graphic from source map: [Homestead \(eastern portion\) 1:100,000 scale Quadrangle \(Surficial and Bedrock Geology\)](#). Cross section D-D' on source map.

Cross Section N-N'



Graphic from source map: [Homestead \(eastern portion\) 1:100,000 scale Quadrangle \(Surficial and Bedrock Geology\)](#). Cross section E-E' on source map.

Cross Section O-O'

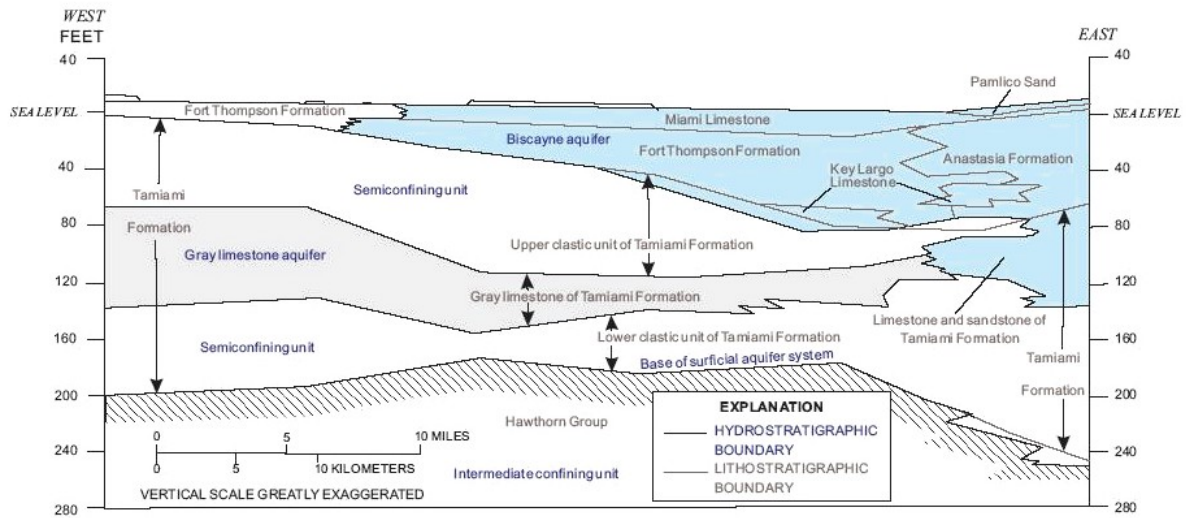


Figure 2. Hydrogeologic section in central Miami-Dade County along Tamiami Trail (modified from Fish and Stewart, 1991, fig. 6b). Line of section shown in figure 1.

Graphic from source map: [Hydrogeology of the Gray Limestone Aquifer](#). Cross section Fig2 on source map.

Cross Section P-P'

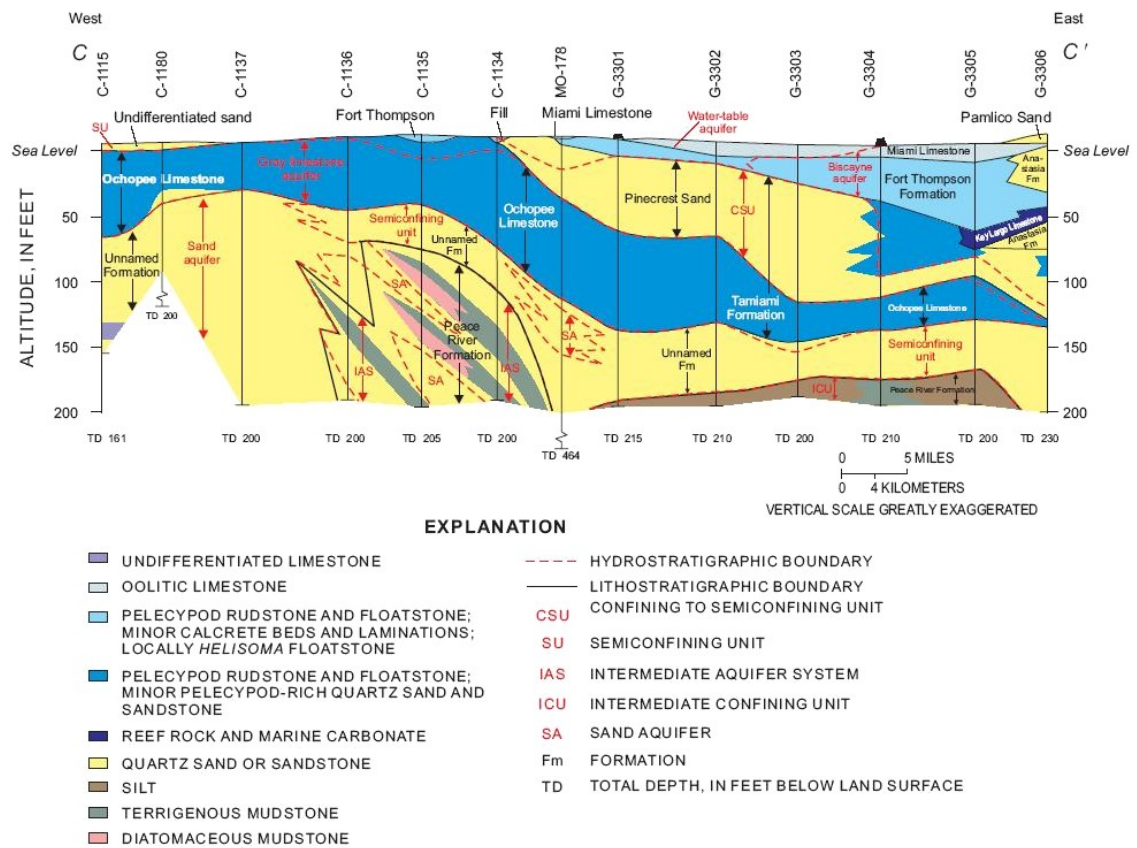


Figure 13. Hydrogeologic section C-C'. Location of section line shown in figure 9. Lithologies of test coreholes C-1134, C-1136, and MO-178 are based in part on descriptions from Weedman and others (1999).

Graphic from source map: [Hydrogeology of the Gray Limestone Aquifer](#). Cross section C-C' on source map.

Digital Benthic Habitat-GIS Map of the eastern portions of Florida Bay (1991-1995 Substrate), Florida

The benthic habitat unit listing and descriptions for these units associated with the GRI Digital Benthic Habitat-GIS Map of the eastern portions of Florida Bay (1991-1995 Substrate), Florida are presented below.

Benthic Habitat Unit List

The benthic habitat units present in the GRI Digital Benthic Habitat-GIS Map of the eastern portions of Florida Bay (1991-1995 Substrate), Florida are listed below. Units are listed with their assigned unit symbol and unit name (e.g., l - Land). No description for water is provided. Information about each benthic habitat unit is also presented in the GRI Benthic Habitat Unit Information (BISCUNIT_benthic_habitat) table included with the GRI digital geologic-GIS data.

Cenozoic Era

Quaternary Period

Holocene Epoch

[l](#) - Land

[rh](#) - Reef/hardbottom, seagrass

[srv](#) - Submersed Aquatic Vegetation (SAV), Submersed Rooted Vascular Plants (SRV), undifferentiated

[srvc](#) - Submersed Aquatic Vegetation (SAV), Submersed Rooted Vascular Plants (SRV), Continuous SRV

[srvcb](#) - Submersed Aquatic Vegetation (SAV), Submersed Rooted Vascular Plants (SRV), Continuous SRV, bank

[srvcpb](#) - Submersed Aquatic Vegetation (SAV), Submersed Rooted Vascular Plants (SRV), Continuous SRV, Dense patches of SRV in matrix of continuous sparse SRV

[srvcpb](#) - Submersed Aquatic Vegetation (SAV), Submersed Rooted Vascular Plants (SRV), Continuous SRV, Dense patches of SRV in matrix of continuous sparse SRV, bank

[srvc](#) - Submersed Aquatic Vegetation (SAV), Submersed Rooted Vascular Plants (SRV), Discontinuous SRV

[srvcdb](#) - Submersed Aquatic Vegetation (SAV), Submersed Rooted Vascular Plants (SRV), Discontinuous SRV, bank

[srvcdd](#) - Submersed Aquatic Vegetation (SAV), Submersed Rooted Vascular Plants (SRV), Discontinuous SRV, dredged

[usm](#) - Unconsolidated sediments, mud

[usmb](#) - Unconsolidated sediments, mud, bank

[usmfb](#) - Unconsolidated sediments, mixed fine, bank

[usmfs](#) - Unconsolidated sediments, mixed fine, seagrass

[ubh](#) - Unknown benthic habitat

[ubhd](#) - Unknown benthic habitat, dredged

[ubhs](#) - Unknown benthic habitat, streams

[ubhstc](#) - Unknown benthic habitat, submersed tidal canals

Benthic Habitat Map Unit Descriptions

Descriptions of all benthic habitat map units are presented below. All descriptions were derived from the source map [Benthic Habitats of Florida Bay](#). Additional information concerning benthic habitat map units can be obtained from the source map at: <https://www.fisheries.noaa.gov/inport/item/47893>.

I - Land

Class: Land
Subclass1: none
Subclass2: none
Subclass3: none
Modifier: none

rh - Reef/hardbottom, seagrass

Class: Reef/Hardbottom
Subclass1: Hardbottom
Subclass2: none
Subclass3: none
Modifier: seagrass

srv - Submersed Aquatic Vegetation (SAV), Submersed Rooted Vascular Plants (SRV), undifferentiated

Class: Submersed Aquatic Vegetation (SAV)
Subclass1: Submersed Rooted Vascular Plants (SRV)
Subclass2: none
Subclass3: none
Modifier: none

srvc - Submersed Aquatic Vegetation (SAV), Submersed Rooted Vascular Plants (SRV), Continuous SRV

Class: Submersed Aquatic Vegetation (SAV)
Subclass1: Submersed Rooted Vascular Plants (SRV)
Subclass2: Continuous SRV
Subclass3: none
Modifier: none

srvcb - Submersed Aquatic Vegetation (SAV), Submersed Rooted Vascular Plants (SRV), Continuous SRV, bank

Class: Submersed Aquatic Vegetation (SAV)
Subclass1: Submersed Rooted Vascular Plants (SRV)
Subclass2: Continuous SRV
Subclass3: none
Modifier: bank

srvcv - Submersed Aquatic Vegetation (SAV), Submersed Rooted Vascular Plants (SRV), Continuous SRV, Dense patches of SRV in matrix of continuous sparse SRV

Class: Submersed Aquatic Vegetation (SAV)
Subclass1: Submersed Rooted Vascular Plants (SRV)
Subclass2: Continuous SRV
Subclass3: Dense patches of SRV in matrix of continuous sparse SRV
Modifier: none

srvcvb - Submersed Aquatic Vegetation (SAV), Submersed Rooted Vascular Plants (SRV), Continuous SRV, Dense patches of SRV in matrix of continuous sparse SRV, bank

Class: Submersed Aquatic Vegetation (SAV)
Subclass1: Submersed Rooted Vascular Plants (SRV)
Subclass2: Continuous SRV
Subclass3: Dense patches of SRV in matrix of continuous sparse SRV
Modifier: bank

srvd - Submersed Aquatic Vegetation (SAV), Submersed Rooted Vascular Plants (SRV), Discontinuous SRV

Class: Submersed Aquatic Vegetation (SAV)
Subclass1: Submersed Rooted Vascular Plants (SRV)
Subclass2: Discontinuous SRV
Subclass3: none
Modifier: none

srvdb - Submersed Aquatic Vegetation (SAV), Submersed Rooted Vascular Plants (SRV), Discontinuous SRV, bank

Class: Submersed Aquatic Vegetation (SAV)
Subclass1: Submersed Rooted Vascular Plants (SRV)
Subclass2: Discontinuous SRV
Subclass3: none
Modifier: bank

srvdd - Submersed Aquatic Vegetation (SAV), Submersed Rooted Vascular Plants (SRV), Discontinuous SRV, dredged

Class: Submersed Aquatic Vegetation (SAV)
Subclass1: Submersed Rooted Vascular Plants (SRV)
Subclass2: Discontinuous SRV
Subclass3: none
Modifier: dredged

usm - Unconsolidated sediments, mud

Class: Unconsolidated Sediments
Subclass1: Mud
Subclass2: none
Subclass3: none
Modifier: none

usmb - Unconsolidated sediments, mud, bank

Class: Unconsolidated Sediments
Subclass1: Mud
Subclass2: none
Subclass3: none
Modifier: bank

usmfb - Unconsolidated sediments, mixed fine, bank

Class: Unconsolidated Sediments
Subclass1: Mixed Fine
Subclass2: none
Subclass3: none
Modifier: bank

usmfs - Unconsolidated sediments, mixed fine, seagrass

Class: Unconsolidated Sediments
Subclass1: Mixed Fine
Subclass2: none
Subclass3: none
Modifier: seagrass

ubh - Unknown benthic habitat

Class: Unknown benthic habitat
Subclass1: none
Subclass2: none
Subclass3: none
Modifier: none

ubhd - Unknown benthic habitat, dredged

Class: Unknown benthic habitat
Subclass1: none
Subclass2: none
Subclass3: none
Modifier: dredged

ubhs - Unknown benthic habitat, streams

Class: Unknown benthic habitat
Subclass1: none
Subclass2: none
Subclass3: none
Modifier: streams

ubhstc - Unknown benthic habitat, submersed tidal canals

Class: Unknown benthic habitat
Subclass1: none
Subclass2: none
Subclass3: none
Modifier: submersed tidal canals

Ancillary Source Map Information

The following sections present ancillary source map information associated with sources used for this project. Information and graphics directly relevant to features present in the GRI digital geologic-GIS data are presented. Each source map's publication site, as well as its site on the National Geologic Map Database (NGMDB) site, if available, is also presented.

Benthic Habitats of Florida Bay

The formal citation for this source.

Florida Fish and Wildlife Commission Florida Marine Research Center, 1999, Benthic Habitats of Florida Bay, Florida 1991-1995, CD-ROM: National Oceanic and Atmospheric Administration Coastal Services Center, unpublished digital data, scale 1:48,000 (*GRI Source Map ID 5046*).

The source map can be accessed from the following site: <https://www.fisheries.noaa.gov/inport/item/47893>

Florida Aquifer Vulnerability Assessment (2005)

The formal citation for this source.

Arthur, J.D., Baker, A.E., Cichon, J.R., Wood, A.R., and Rudin, A., 2005, Florida Aquifer Vulnerability Assessment (FAVA): Contamination Potential of Florida's Principal Aquifer Systems: Florida Geological Survey, Bulletin [in review], scale 1:24,000 (*GRI Source Map ID 6921*).

The source map can be accessed from the following site: http://ufdcimages.uflib.ufl.edu/UF/00/09/91/61/00001/FAVA_REPORT_MASTER_DOC_3-21-05.pdf. This source served as the source map for the GRI Digital Geohazards-GIS Map of Biscayne National Park and Vicinity (2005 Mapping), Florida.

Geologic Formations of Florida

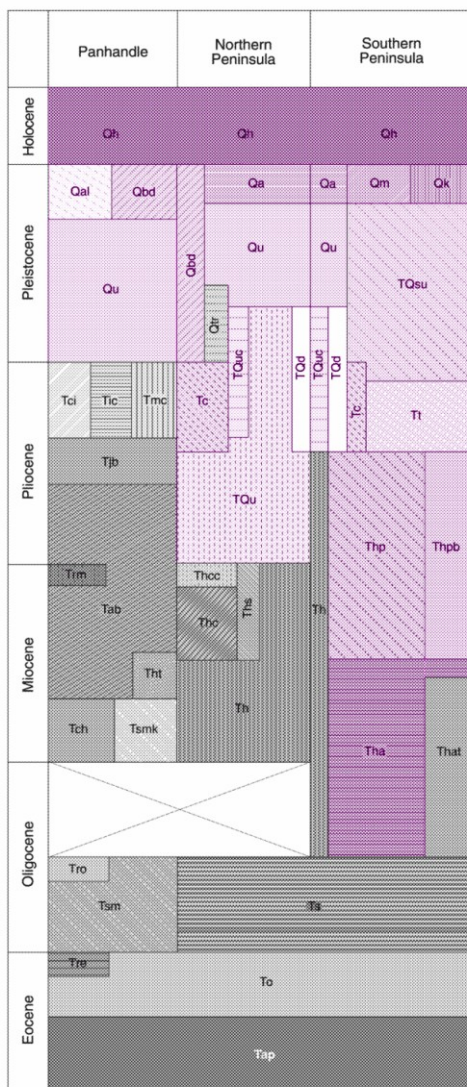
The formal citation for this source.

Scott, Thomas M., 2001, Geologic Formations of Florida (digital): Florida Geological Survey, Open-File Report 80, scale 1:126,720 (*GRI Source Map ID 3682*).

Related text and graphics, including the unit descriptions derived for this source map, can be accessed from the following site: <https://ufdc.ufl.edu/UF00094041/00001>

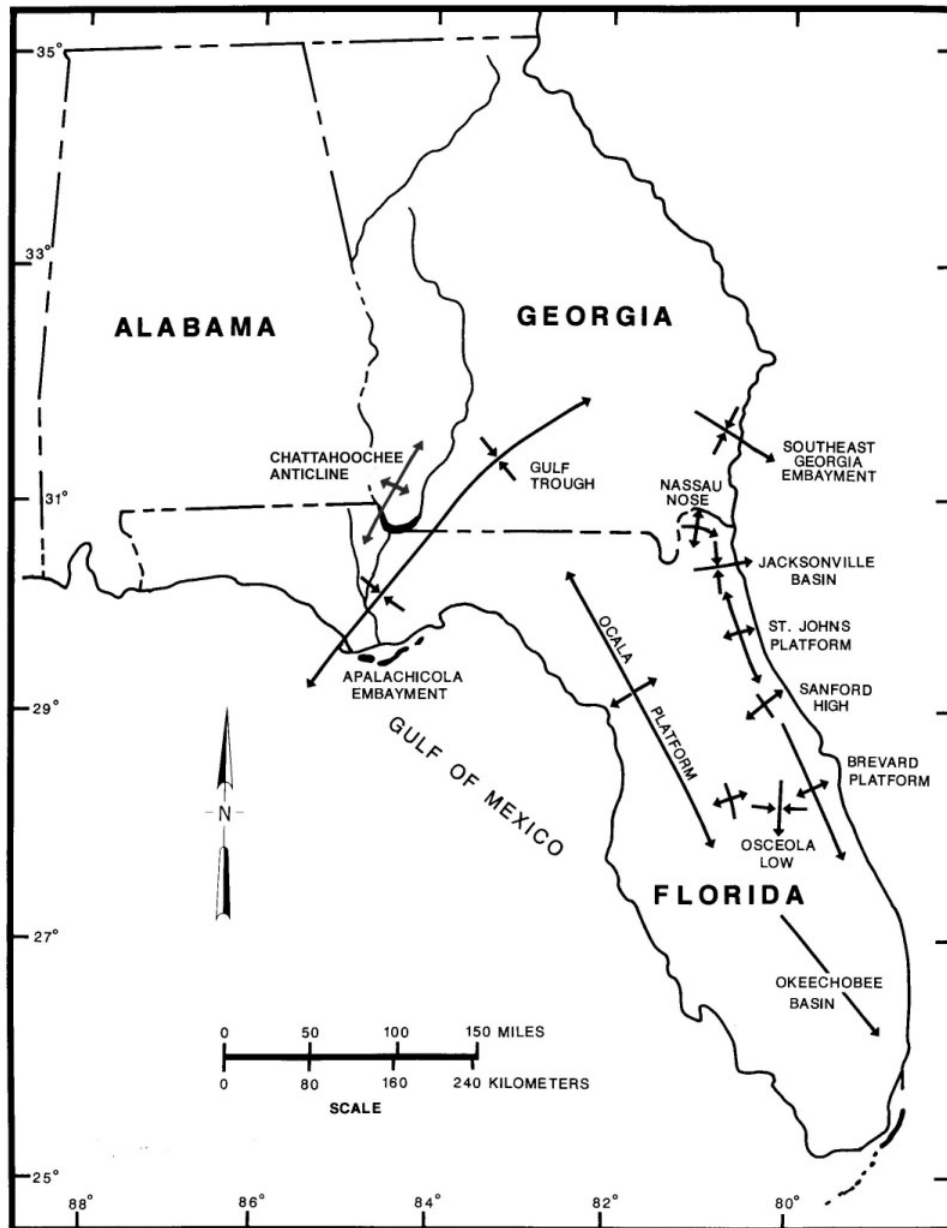
Prominent graphics associated with this source.

Stratigraphic Section



Graphic from source map: [Geologic Formations of Florida](#). Holocene and Pleistocene southern peninsula units are those found in the extent of the GRI digital geologic-GIS map.

Figure 4: Geologic structures in Florida (modified from Scott, 1988).



Graphic from source map: [Geologic Formations of Florida](#)

Homestead (eastern portion) 1:100,000 scale Quadrangle (Surficial and Bedrock Geology)

The formal citation for this source.

Green, Richard, Campbell, Ken, and Scott, Tom, 1995, Surficial and Bedrock Geology of the eastern portion of the USGS 1:100,000 scale Homestead Quadrangle: Florida Geological Survey, Open File Map Series 83/01-07, scale 1:100,000. (*GRI Source Map ID 4983*).

The source map can be accessed from the following site: <https://ufdc.ufl.edu/UF00099543/00001>. Images associated with the source map are also available at: https://ngmdb.usgs.gov/Prodesc/proddesc_31330.htm

Homestead (western portion) 1:100,000 scale Quadrangle (Surficial and Bedrock Geology)

The formal citation for this source.

Green, Richard, Campbell, Ken, and Scott, Tom, 1996, Surficial and Bedrock Geology of the western portion of the USGS 1:100,000 scale Homestead Quadrangle: Florida Geological Survey, Open File Map Series 83/08-12, scale 1:100,000. (*GRI Source Map ID 2424*).

The source map can be accessed from the following site: <https://ufdc.ufl.edu/UF00099544/00001>. Images associated with the source map are also available at: https://ngmdb.usgs.gov/Prodesc/proddesc_31329.htm

Hydrogeology of the Gray Limestone Aquifer

The formal citation for this source.

Reese, R.S., and Cunningham, K.J., 2000, Hydrogeology of the Gray Limestone Aquifer in southern Florida: U.S. Geological Survey, Water-Resources Investigations Report 99-4213, scale 1:675,000 (*GRI Source Map ID 5320*).

The source map can be accessed from the following site: <https://pubs.er.usgs.gov/publication/wri994213>

Surficial Aquifer System (Dade County)

The formal citation for this source.

Causaras, C.R., 1986, Geology of the Surficial Aquifer System, Dade County, Florida: U.S. Geological Survey, Water-Resources Investigations Report 86, scale 1:136,000 (*GRI Source Map ID 3056*).

The source map can be accessed from the following site: <https://pubs.er.usgs.gov/publication/wri864126>. Images associated with the source map are also available at: https://ngmdb.usgs.gov/Prodesc/proddesc_36566.htm

GRI Digital Data Credits

This document was developed and completed by Stephanie O'Meara (Colorado State University) for the NPS Geologic Resources Division (GRD) Geologic Resources Inventory (GRI) Program. Quality control of this document by James Winter (Colorado State University).

The information in this document was compiled from GRI source maps and is intended to accompany the digital geologic-GIS maps and other digital data for Biscayne National Park, Florida (BISC) developed by Stephanie O'Meara (see the [GRI Digital Maps and Source Map Citations](#) section of this document for all sources used by the GRI in the completion of this document and related GRI digital geologic-GIS maps). Initial GRI digital geologic-GIS data was produced by Anne Poole (NPS GRD) and Heather Stanton (Colorado State University).

GRI finalization by Stephanie O'Meara.

GRI program coordination and scoping provided by Bruce Heise, Jason Kenworthy and Tim Connors (NPS GRD, Lakewood, Colorado).