

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



Fort Pulaski National Monument

GRI Ancillary Map Information Document

Produced to accompany the Geologic Resources Inventory (GRI) Digital Geologic Data for Fort Pulaski National Monument

fopu_geology.pdf

Version: 8/12/2014

Geologic Resources Inventory Map Document for Fort Pulaski National Monument

Table of Contents

Geologic Resources Inventory Map Document	1
About the NPS Geologic Resources Inventory Program	2
GRI Digital Map and Source Map Citations	4
Geologic Map Unit List	5
Geologic Map Unit Descriptions	6
Sediments deposited on top of any map unit.....	6
Qme - Moved earth (Modern).....	6
Sediments Beneath the Holocene Terrace.....	6
Habf - Sand in beach ridges (Holocene).....	6
Hbr - Beach ridge sands (Holocene).....	6
Hfw - Freshwater marsh and swamp deposits (Holocene).....	6
Hs - Molluscan conglomerate (Holocene).....	6
Hsm - Saltmarsh deposits (Holocene).....	7
Hsmc - Saltmarsh intermixed with oyster beds and ridges (Holocene?).....	7
HPef - Fringe deposits (Holocene or Pleistocene).....	7
HPEbr - Beach-ridge sand (Holocene or Pleistocene).....	7
Sediments Beneath the Silver Bluff Terrace.....	7
HPEsbe - Eolian sand (Pleistocene or Holocene).....	8
PEsbs - Strand deposits (Pleistocene).....	8
Sediments on or Beneath the Princess Anne Terrace.....	8
HPEpae - Eolian sand (Pleistocene or Holocene).....	8
Sediments Beneath the Princess Anne Terrace.....	8
PEppas - Barrier-island deposits (Pleistocene).....	8
PEpam - Estuarine deposits or marine deposits or both (Pleistocene).....	8
Geologic Cross Section	9
Geologic Cross Section A-A'.....	9
Additional SCGS Source Map Information	10
Map Location.....	10
Drill Hole Logs.....	10
GRI Digital Data Credits	11

Geologic Resources Inventory Map Document



Fort Pulaski National Monument, Georgia and South Carolina

Document to Accompany Digital Geologic-GIS Data

[fopu_geology.pdf](#)

Version: 8/12/2014

This document has been developed to accompany the digital geologic-GIS data developed by the Geologic Resources Inventory (GRI) program for Fort Pulaski National Monument (FOPU).

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.

National Park Service (NPS) Geologic Resources Inventory (GRI) Program staff have assembled the digital geologic-GIS data that accompanies this document.

For information about the status of GRI digital geologic-GIS data for a park contact:

Tim Connors
Geologist/GRI Mapping Contact
National Park Service Geologic Resources Division
P.O. Box 25287
Denver, CO 80225-0287
phone: (303) 969-2093
fax: (303) 987-6792
email: Tim_Connors@nps.gov

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

Stephanie O'Meara
Geologist/GIS Specialist/Data Manager
Colorado State University Research Associate, Cooperator to the National Park Service
1201 Oak Ridge Drive, Suite 200
Fort Collins, CO 80525
phone: (970) 491-6655
e-mail: stephanie.omeara@colostate.edu

About the NPS Geologic Resources Inventory Program

Background

Recognizing the interrelationships between the physical (geology, air, and water) and biological (plants and animals) components of the Earth is vital to understanding, managing, and protecting natural resources. The Geologic Resources Inventory (GRI) helps make this connection by providing information on the role of geology and geologic resource management in parks.

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 Geologic Resources Inventory aims to raise awareness of geology and the role it plays in the environment, and to provide natural resource managers and staff, park planners, interpreters, researchers, and other NPS personnel with information that can help them make informed management decisions.

The GRI team, working closely with the Colorado State University (CSU) Department of Geosciences and a variety of other partners, provides more than 270 parks with a geologic scoping meeting, digital geologic-GIS map data, and a park-specific geologic report.

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: <http://science.nature.nps.gov/im/inventory/geology/GeologyGISDataModel.cfm>

Geologic Reports: Park-specific geologic reports identify geologic resource management issues as well as features and processes that are important to park ecosystems. In addition, these reports present a brief geologic history of the park and address specific properties of geologic units present in the park.

For a complete listing of Geologic Resource Inventory products and direct links to the download site visit the GRI publications webpage http://www.nature.nps.gov/geology/inventory/gre_publications.cfm

GRI geologic-GIS data is also available online at the NPS Data Store Search Application: <http://irma.nps.gov/App/Reference/Search>. 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: <http://www.nature.nps.gov/geology/inventory>, or contact:

Bruce Heise
Inventory Coordinator
National Park Service Geologic Resources Division
P.O. Box 25287
Denver, CO 80225-0287
phone: (303) 969-2017
fax: (303) 987-6792
email: Bruce_Heise@nps.gov

The Geologic Resources Inventory (GRI) program is funded by the National Park Service (NPS) Inventory and Monitoring (I&M) Division.

GRI Digital Map and Source Map Citations

The GRI digital geologic-GIS maps for Fort Pulaski National Monument (FOPU), Georgia and South Carolina:

GRI Digital Geologic Map of Fort Pulaski National Monument and Vicinity, Georgia and South Carolina (*GRI MapCode FOPU*)

The digital geologic-GIS map was produced using the following sources,

Doar, W.R., 2002, Geologic Map of the Fort Pulaski Quadrangle, Beaufort and Jasper Counties, South Carolina, South Carolina Geological Survey, Geologic Quadrangle Map GQM-5, scale 1:24,000. (*GRI Source Map ID 75098*).

Doar, W.R., Jubran, R., and Jackson, C.W., 2014, Coastal Geomorphology and Geology of the Ft. Pulaski Quadrangle: An Update; South Carolina Geological Survey, University of Georgia, and Georgia Southern University, preliminary digital data and map, scale 1:24,000. (*GRI Source Map ID 75948*).

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

Geologic Map Unit List

The units present on the GRI Digital Geologic Map of Fort Pulaski National Monument and Vicinity, Georgia and South Carolina are listed below. Units are listed with their assigned unit symbol and unit name (e.g., Qme - moved earth). Units are listed by geologic environment as per the source map. Information about each geologic unit is also presented in this dataset's Geologic Unit Information (FOPUUNIT) table included with the GRI geologic-GIS data.

Cenozoic Era

Quaternary Period

[Qme](#) - Moved earth

Sediments Beneath the Holocene Terrace (Holocene Epoch)

[Habf](#) - Sand in beach ridges

[Hbr](#) - Beach ridge sands

[Hfw](#) - Freshwater marsh and swamp deposits

[Hs](#) - Molluscan conglomerate

[Hsm](#) - Salt-marsh deposits

[Hsmc](#) - Salt-marsh intermixed with oyster beds and ridges

Sediments Beneath the Holocene Terrace (Holocene or Pleistocene Epochs)

[HPEf](#) - Fringe deposits

[HPEebr](#) - Beach-ridge sand

Sediments Beneath the Silver Bluff terrace (Pleistocene or Holocene Epochs)

[HPEsbe](#) - Eolian sand

Sediments Beneath the Silver Bluff terrace (Pleistocene Epoch)

[PEsbs](#) - Strand deposits

Sediments on or Beneath the Princess Anne terrace (Pleistocene or Holocene Epochs)

[HPEpae](#) - Eolian sand

Sediments Beneath the Princess Anne terrace (Pleistocene Epoch)

[PEppas](#) - Barrier-island deposits

[PEpam](#) - Estuarine deposits or marine deposits or both

Geologic Map Unit Descriptions

Descriptions of all geologic map units, generally listed from youngest to oldest, are presented below. Source unit symbols, names and ages are listed just above the unit description text, in the font size of the unit description text, if one or more vary from the assigned GRI unit symbol, and recognized name and age (e.g., unit "Qme - Modern earth (Modern)" is actually unit "me" and of "Holocene age" on the source publication, therefore, the source symbol, name and age, "me - moved earth (Holocene)").

Sediments deposited on top of any map unit

Qme - Moved earth (Modern)

me - Moved earth (Holocene) – Bulk, earthen material moved by humans. Color is highly variable and dependant on source location. Thickness is up to 10 feet. ([SCGS Geologic Quadrangle Map GQM-5](#))

Sediments Beneath the Holocene Terrace

Sediments beneath the Holocene terrace are deposited in response to current sea level. They generally are below the elevation of 10 feet at their landward margin where they overlap, overlie, or abut sediments of the Silver Bluff terrace. ([SCGS Geologic Quadrangle Map GQM-5](#))

Habf - Sand in beach ridges (Holocene)

QHabf - Sand in beach ridges (Holocene) – White (N9) to medium gray (N5), well-sorted, subrounded, fine and medium-grained quartz sand with some very fine heavy mineral sand and scattered, well-rounded, fine-grained, phosphorite sand. Marine and eolian sands occur along the active beach face and in successively older ridges behind the active ridge. Thickness is 3 to 20 feet. ([SCGS Geologic Quadrangle Map GQM-5](#))

Hbr - Beach ridge sands (Holocene)

QHbr - Beach ridge sands (Holocene) – Quartz sand, white (N9) to medium-gray (N5), bimodal, subrounded, fine- and medium-grained with very fine heavy mineral sand and sparse, well-rounded, fine-grained, phosphorite sand. Thickness 3 to 20 feet. ([SCGS Geologic Quadrangle Map GQM-5](#))

Hfw - Freshwater marsh and swamp deposits (Holocene)

QHfw - Freshwater marsh and swamp deposits (Holocene) – Silty clay and peat, black (N1), deposited in stream valleys and areas of locally low elevation. Deposits are identified by the content of organic materials, sediment type, water salinity and ecozones. Thickness 1 to 40 feet. ([SCGS Geologic Quadrangle Map GQM-5](#))

Hs - Molluscan conglomerate (Holocene)

QHs - Molluscan conglomerate (Holocene) – Deposit of very little to no silts, clays, and non-cemented, angular to well-rounded, very poorly sorted, very fine to coarse grained, quartz sand and disarticulated valves, some broken and polished or abraded, 2 to 9 cm in length, of several species of

bivalve molluscs, predominantly intertidal oysters (*Crassostrea virginica*) and clams (*Mercenaria mercenaria* or *Mercenaria campechiensis*). Deposits occur as shell banks built by wave action transporting the shells from live-grounds often emplacing them in dense, imbricate layers. Thickness is less than 1 foot to 12 feet. ([SCGS Geologic Quadrangle Map GQM-5](#))

Hsm - Saltmarsh deposits (Holocene)

QHsm - Salt-marsh deposits (Holocene) – Gooney, black (N1), silty clay and scattered to lenses of well-sorted, subrounded, very fine-grained quartz sand; occurs in the intertidal zone in estuaries; covered by salt-water grasses (*Spartina alterniflora*, *Juncus* or *Salidea*). Thickness is 3 to 30 feet. ([SCGS Geologic Quadrangle Map GQM-5](#))

Hsmc - Saltmarsh intermixed with oyster beds and ridges (Holocene?)

Soupy, grey to black in color, silty clay and scattered lenses of well-sorted, very fine-grained quartz sand; occurs in the intertidal zone in estuaries; interbedded with non-living oyster shells and covered by salt-water grasses (*Spartina alterniflora*, *Juncus* or *Salidea*) and living oysters reefs in some places. Linear and fragmented oyster shell ridges are found within, and near the borders of the unit. Thickness of this unit can vary from 3 to 20-plus feet. ([Coastal Geomorphology and Geology of the Ft. Pulaski Quadrangle](#))

HPef - Fringe deposits (Holocene or Pleistocene)

QHf - Fringe deposits (Holocene or Pleistocene) – Black (N1) to variegated sediments of adjoining subareal deposits and commonly covered by less than 3 feet of modern estuarine muds and sands or reoccupied by Holocene salt-water vegetation. Deposits occur along the inland edges of intertidal to supertidal deposits. Thickness is less than 3 feet. ([SCGS Geologic Quadrangle Map GQM-5](#))

HPeabr - Beach-ridge sand (Holocene or Pleistocene)

QHebr - Beach-ridge sand (Holocene or Pleistocene) – White (N9) to medium gray (N5), moderately sorted to well-sorted, subrounded to well-rounded, fine- to coarse-grained quartz sand. Composite deposits of former, beach-face dune ridges and former, ocean-fronting barrier strands. Thickness is 3 to 25 feet. ([SCGS Geologic Quadrangle Map GQM-5](#))

Sediments Beneath the Silver Bluff Terrace

Sediments beneath the Silver Bluff terrace generally lie above elevations of 6 feet at their seaward margin, where they are overlapped by Holocene deposits. Sediments beneath the Silver Bluff terrace generally lie below elevations of 10 feet at their landward margin where they overlap, overlie or abut sediments of the Princess Anne terrace. ([SCGS Geologic Quadrangle Map GQM-5](#))

HPEsbe - Eolian sand (Pleistocene or Holocene)

QPsbe - Eolian sand (Pleistocene or Holocene) – Very pale brown (10YR 8/4) to very dark brown (10YR 2/2), very well-sorted, subrounded to well-rounded, fine-grained quartz sand, with a trace of silt and fine-grained heavy minerals. Sand is derived from sediments beneath the Silver Bluff terrace. Thickness is up to 15 feet. ([SCGS Geologic Quadrangle Map GQM-5](#))

PEsbs - Strand deposits (Pleistocene)

QPsbs - Strand deposits (Pleistocene) – Light gray (N7) to dark gray (N3), poorly to moderately well-sorted, subrounded to well-rounded, fine-grained quartz sand, with common fine-grained heavy minerals, phosphorite sand and shell hash. Deposits form sub-parallel ridges. Thickness from 4 to 50 feet. ([SCGS Geologic Quadrangle Map GQM-5](#))

Sediments on or Beneath the Princess Anne Terrace

HPEpae - Eolian sand (Pleistocene or Holocene)

QPpae - Eolian sand (Pleistocene or Holocene) – Very pale brown (10YR 8/4) to very dark brown (10YR 2/2), very well-sorted, subrounded to well-rounded, fine-grained quartz sand, with traces of silt, organic materials and fine-grained heavy minerals. Sand is derived from sediments beneath the Princess Anne terrace. Thickness is up to 25 feet. ([SCGS Geologic Quadrangle Map GQM-5](#))

Sediments Beneath the Princess Anne Terrace

Sediments beneath the Princess Anne terrace generally lie above elevations of 12 feet at their seaward margin where they are overlapped by Silver Bluff terrace and Holocene deposits. Sediments beneath the Princess Anne terrace generally lie below elevations of 18 feet at their landward margin where they overlap, overlie or abut sediments of the Pamlico terrace. ([SCGS Geologic Quadrangle Map GQM-5](#))

PEppas - Barrier-island deposits (Pleistocene)

QPpas - Strand deposits (Pleistocene) – Light gray (N7) to dark gray (N3), phosphatic, poorly to moderately well-sorted, subrounded to well-rounded, fine-grained quartz sand, with common fine-grained heavy minerals, medium-grained shell sand (shell hash) and trace amounts of fine micas. Strand deposits form sub-parallel ridges. Thickness from 4 to 50 feet. ([SCGS Geologic Quadrangle Map GQM-5](#))

PEpam - Estuarine deposits or marine deposits or both (Pleistocene)

QPpam - Estuarine deposits or marine deposits or both (Pleistocene) – In lower part, medium blue gray (5B 5/1), poorly sorted, subrounded to very angular, fine- to very coarse-grained phosphatic and quartz sand; with subrounded to very angular phosphatic cobbles and trace amounts of very fine-grained heavy minerals. Lower part from 10 to 20 feet thick. In upper part, medium light gray (N6) to medium bluish gray (5B 5/1), mixed clays, silts, silty clays, clayey silts, silty sands, clayey sands, phosphatic sands and quartzose sands and shells. Some zones contain broken and intact *Oliva*, *Polinices*, *Terebra*, *Mercenaria*, and *Dosinia*. Upper part from 1 to 10 feet thick. ([SCGS Geologic Quadrangle Map GQM-5](#))

Geologic Cross Section

The geologic cross section present in the GRI Digital Geologic Map of Fort Pulaski National Monument, Georgia and South Carolina is presented below. The cross section graphics was scanned at a high resolution and can be viewed in more detail by zooming in (when viewing the digital format of this document).

Geologic Cross Section A-A'



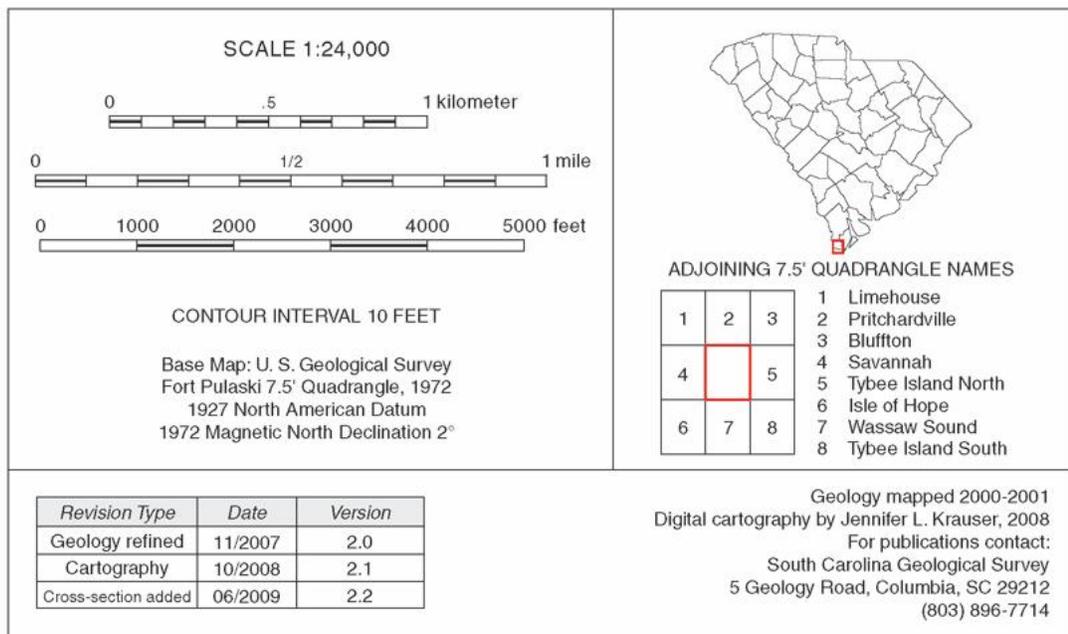
Extracted from: ([SCGS Geologic Quadrangle Map GQM-5](#))

Additional SCGS Source Map Information

Doar, W.R., 2002, Geologic Map of the Fort Pulaski Quadrangle, Beaufort and Jasper Counties, South Carolina, South Carolina Geological Survey, Geologic Quadrangle Map GQM-5, scale 1:24,000. (GRI Source Map ID 75098).

Map Location

www.dnr.sc.gov/geology



Extracted from: ([SCGS Geologic Quadrangle Map GQM-5](#))

Drill Hole Logs

(Drill hole data consists of) South Carolina Department of Natural Resources Geological Survey (SCGS) drill hole locations with log identification numbers. All logs are on file at the SCGS. *Extracted from:* ([SCGS Geologic Quadrangle Map GQM-5](#))

GRI Digital Data Credits

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

The information contained here was compiled to accompany the digital geologic-GIS maps and other digital data for Fort Pulaski National Monument (FOPU), *Georgia* developed by Georgia Hybels (NPS GRD) using [source digital data](#) produced by the South Carolina Geological Survey, the University of Georgia, and Georgia Southern University. Quality control provided by Stephanie O'Meara

GRI finalization by Stephanie O'Meara.

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