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

Fort Davis National Historic Site

GRI Ancillary Map Information Document

Produced to accompany the Geologic Resources Inventory (GRI) Digital Geologic Data for Fort Davis National Historic Site

foda_geology.pdf

Version: 2/11/2022

Geologic Resources Inventory Map Document for Fort Davis National Historic Site

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Geologic Resources Inventory Map Document

Fort Davis National Historic Site, Texas

Document to Accompany Digital Geologic-GIS Data

foda_geology.pdf

Version: 2/11/2022

This document has been developed to accompany the digital geologic-GIS data developed by the Geologic Resources Inventory (GRI) program for Fort Davis National Historic Site, Texas (FODA).

Attempts have been made to reproduce all aspects of the original source products, including the geologic units and their descriptions, as well as 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 Map and Source Citation** – A listing of the GRI digital geologic-GIS map produced for this project along with source used in its completion. A brief explanation of the source map was used is also provided.

3) **Map Unit List** – A listing of all geologic map units present on maps for this project, generally listed from youngest to oldest.

4) **Map Unit Descriptions** – Descriptions for all geologic map units present on the GRI digital geologic-GIS dataset.

5) **Ancillary Source Map Information** – Relevant graphics and text present on the source map.

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 Map and Source Map Citation

The GRI digital geologic-GIS map for Fort Davis National Historic Site, Texas (FODA):

Digital Geologic-GIS Map of Fort Davis National Historic Site and Vicinity, Texas (*GRI MapCode FODA*)

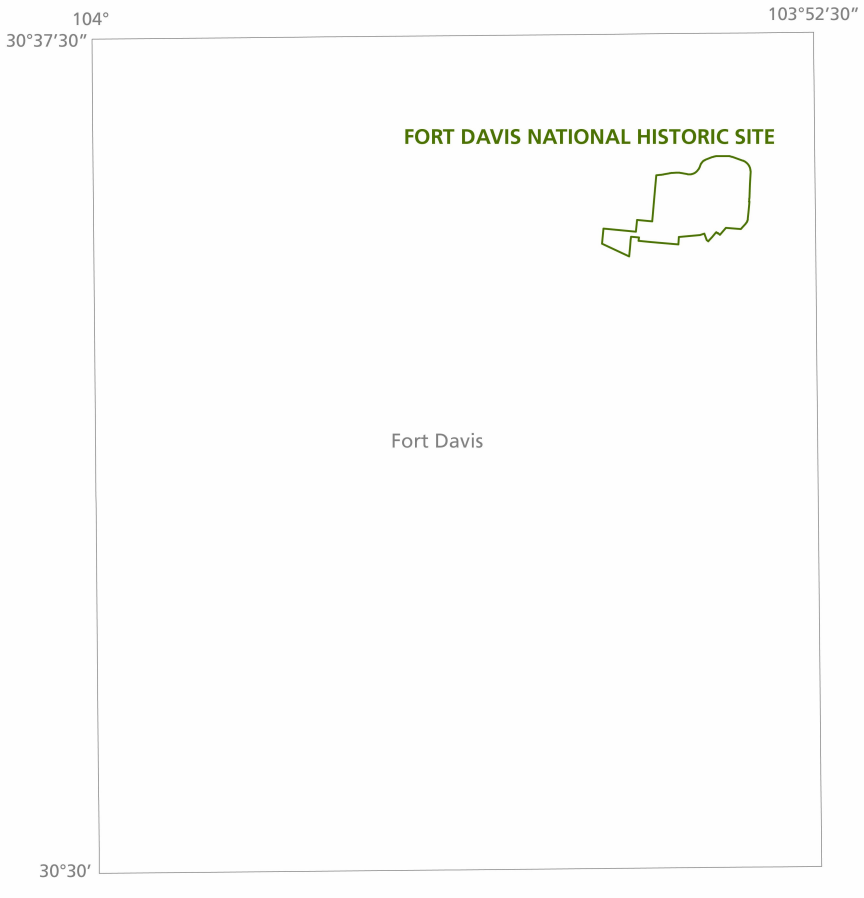
The map was produced from the following source map, however, only a portion, that of the Fort Davis quadrangle extent, was used from the source map.

> Barnes, V. E. et al., 1982 (Revised 1994), Geologic Atlas of Texas, Fort Stockton Sheet: Texas Bureau of Economic Geology, University of Texas at Austin, Geologic Atlas of Texas 16, scale 1:250,000 (Fort Stockton Sheet (revised 1994)). (*GRI Source Map ID 2518*).

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

Index Map

The following index map displays the extent of the GRI digital geologic-GIS maps produced for Fort Davis National Historic Site (FODA) in gray (the extent of the Fort Davis 7.5' quadrangle). The boundary for Fort Davis National Historic Site (as of February, 2022) is outlined in green.



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

Map Unit List

The geologic units present in the digital geologic-GIS data produced for Fort Davis National Historic Site, Texas (FODA) are listed below. Units are listed with their assigned unit symbol and unit name (e.g., Qal - Alluvium). Units are listed from youngest to oldest. Information about each geologic unit is also presented in the GRI Geologic Unit Information (FODAUNIT) table included with the GRI digital geologic-GIS data.

Cenozoic Era

Quaternary Period

Qal - Alluvium
Qf - Fan deposits

Tertiary Period

Ti - Intrusive igneous rocks
Tpe - Petan Basalt
Tml - Mount Locke Formation
Tbs - Barrel Spring Formation
Tsl - Sleeping Lion Formation
Tfc - Frazier Formation
Tl - Limpia Formation

Map Unit Descriptions

Descriptions of all geologic map units, generally listed from youngest to oldest, are presented below. All unit descriptions from source map Fort Stockton Sheet (revised 1994).

Qal - Alluvium

Floodplain and alluvial plain deposits; floodplain deposits include low terrace deposits near floodplain level, bedrock locally in stream channels; alluvial plain deposits include fan deposits and colluvium locally near margins, coarser material toward margins, mostly sandy silt elsewhere, subject to modification by sheetwash action.

Qf - Fan Deposits

Colluvium and fan deposits, includes older Quaternary deposits in some areas.

Ti - Intrusive Igneous Rocks

Stocks, plugs, laccoliths, sills, and dikes. Major rock types are hawaiite, mugearite, trachyte, quartz trachyte, rhyolite, peralkaline rhyolite, phonolite, trachyandesite, dacite, basalt, and their coarser grained equivalents.

Tpe - Petan Basalt

Mafic flows, dark greenish gray to brownish gray; thickness up to 510 feet to the west on the Marfa sheet, considerably thinner on the Fort Stockton sheet, includes the Jones Formation of the southern Davis Mountains.

Tml - Mount Locke Formation

Quartz trachyte and rhyolite porphyry, gray, weathered surface rough, brownish gray to reddish brown; thickness 580 feet at type locality on Marfa sheet to the west.

Tbs - Barrel Spring Formation

From top down: indurated to friable, fine-grained vitric tuff; nonfoliated porphyritic rhyolite; pinkish gray to purplish brown, foliated porphyritic rhyolite; black foliated vitrophyre; thickness about 105 feet at type locality, thickens eastward to 290 feet in Barrilla Mountains; K-Ar age, 35.6 ± 0.3 m.y. (4 samples).

Tsl - Sleeping Lion Formation

Porphyritic, rhyolitic ash-flow tuff, reddish brown to gray; has well-developed columnar jointing; thickness 329 feet at type locality, 610 feet 9 miles east of Fort Davis; K-Ar age, 36.2 ± 0.4 m.y. (2 samples).

Tfc - Frazier Canyon Formation

Vitric-lithic-crystal tuff, locally contains conglomerate and sandstone, poorly bedded; white to light brown, gray, yellow, or green; 3 units separated by numerous mafic flows; thickness of formation at type locality 351 feet, somewhat thicker in Fort Davis area and Barrilla Mountains.

Tl - Limpia Formation

Coarsely porphyritic trachyte, fine-grained, slightly vesicular, dark reddish brown; forms low rolling hills; thickness 300 feet (estimated).

Ancillary Source Map Information

The following sections present ancillary source map information associated with sources used for this project.

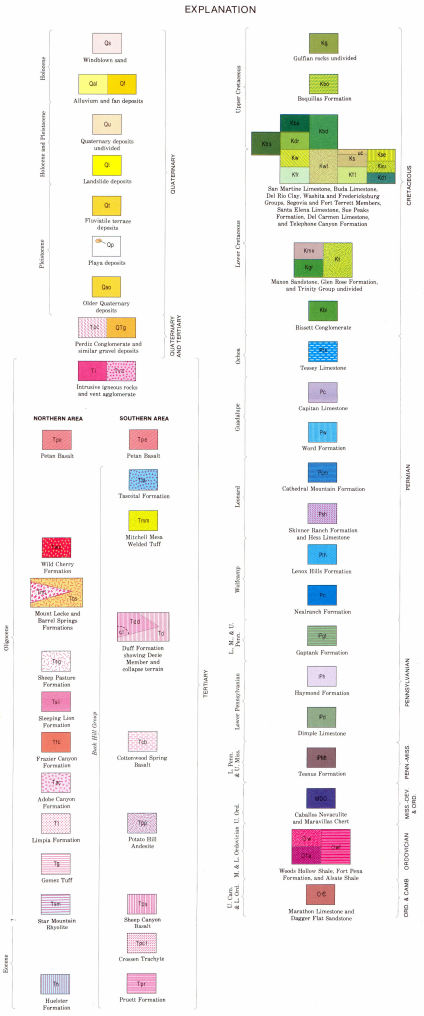
Fort Stockton Sheet (revised 1994)

The formal citation for this source.

> Barnes, V. E. et al., 1982 (Revised 1994), Geologic Atlas of Texas, Fort Stockton Sheet: Texas Bureau of Economic Geology, University of Texas at Austin, Geologic Atlas of Texas 16, scale 1:250,000 (*GRI Source Map ID 2518*).

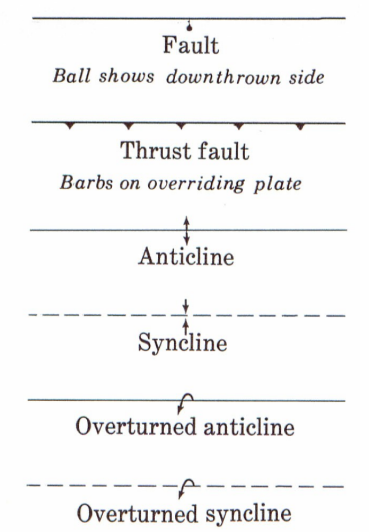
Prominent graphics and text associated with this source.

Correlation of Map Units



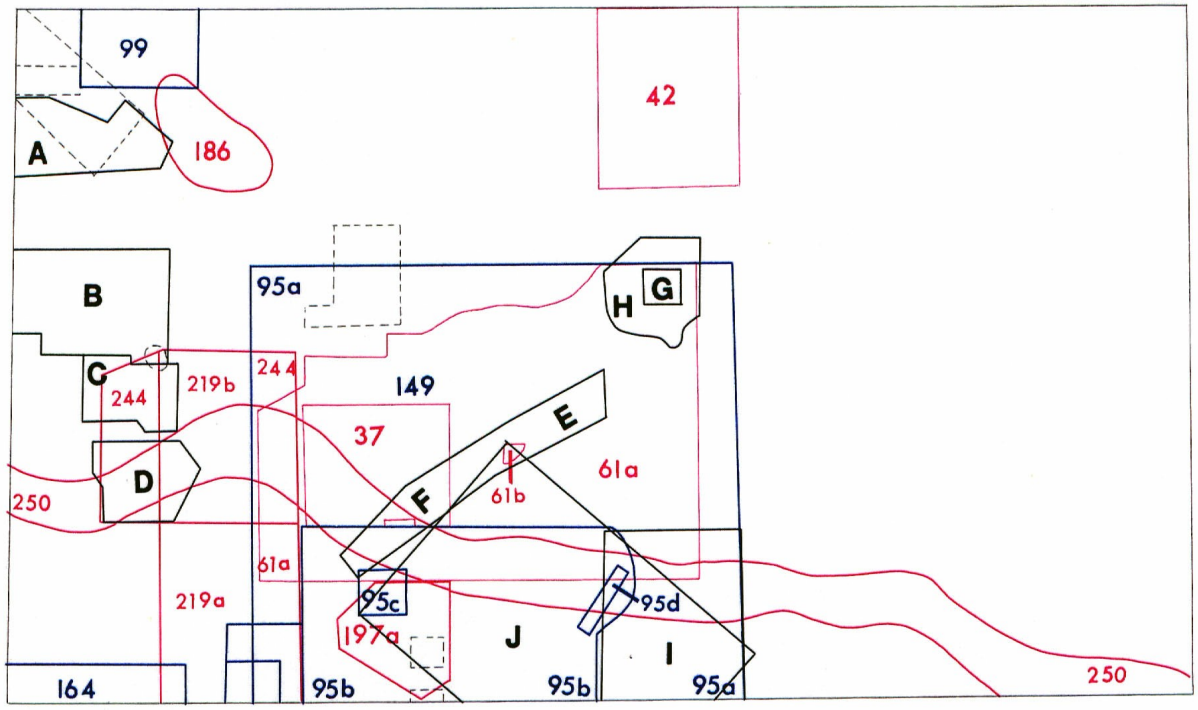
Graphic from source map: Fort Stockton Sheet (revised 1994). Of note, as the GRI digital geologic-GIS map used only a portion of the source map only a subset of the geologic units present in the above correlation are present in the GRI digital geologic-GIS data.

Legend



Graphic from source map: Fort Stockton Sheet (revised 1994). Of note, the GRI digital geologic-GIS map used only a portion of the source map. In the extent of the GRI digital geologic-GIS data no faults or folds were mapped.

Index Map



Graphic from source map: Fort Stockton Sheet (revised 1994).

Numbers in outlined areas refer to items in bibliography in "Index to Areal Geologic Maps in Texas, 1891-1961," by T.E. Brown (1963), Bureau of Economic Geology, Univ. Texas, Austin. For area **A,** see

D.F. Parker, Jr. (1972) Stratigraphy, petrography and K-Ar geochronology of volcanic rocks, northeastern Davis Mountains, Trans-Pecos Texas, Univ. Texas, Austin, M.A. thesis, 136 p.; for area **B,** see M.A. Smith (1975) Geology and trace element geochemistry of the Fort Davis area, Trans-Pecos Texas, Univ. Texas, Austin, Ph. D. dissertation, 231 p.; for area **C** see D.E. Gorski (1970) Geology and trace transition element variation of the Mitre Peak area, Trans-Pecos Texas, Univ. Texas, Austin, M.A. thesis, 200 p.; for area **D**, see D.F. Parker, Jr. (1976) Petrology and eruptive history of an Oligocene trachytic shield volcano, near Alpine, Texas, Univ. Texas, Austin, Ph. D. dissertation, 183 p.; for area **E**, see C.A. Ross (1963) Standard Wolfcampian Series (Permian) Glass Mountains, Texas, U.S. Geol. Survey, Memoir 88, plate 1; for area **F**, see W.B. Rogers (1972) Depositional environments of the Skinner Ranch and Hess Formations (Lower Permian), Glass Mountains, West Texas, Univ. Texas, Austin, Ph.D. dissertation, 392 p.; for area **G**, see K.A. Howard, T.W. Offield, and H.G. Wilshire (1972) Structure of Sierra Madera, Texas, as a guide to central peaks in lunar craters, Geol. Soc. America Bull., v. 83, p. 2795-2808, fig. 5; for area **H**, see H.G. Wilshire, T. W. Offield, K.A. Howard, and D. Cummings (1972) Geology of the Sierra Madera cryptoexplosion structure, Pecos County, Texas, U.S. Geol. Survey Prof. Paper 599-H, 42 p., plate 2; for area **I**, P.B. King kindly furnished his 1977 photogeology at scale of 1:62,500 for Dawn McKalips to field check; for area **J**, see W.R. Muehlberger, W.D. DeMis, and J.O. Leason (1984) Geologic map and cross section, Marathon Region, Trans-Pecos Texas, Geol. Soc. America Map and Chart Series MC-28C, scale 1:250,000.

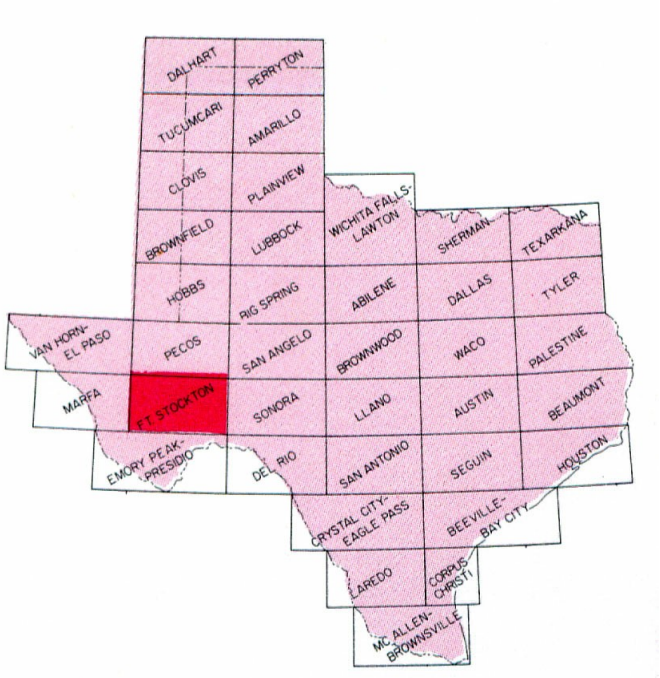
Additional references consulted:

Maxwell, R.A., and Dietrich, J.W., 1970, Correlation of Tertiary rock units, West Texas: Univ. Texas, Austin, Bur. Econ. Geology, Rept. Inv. 70, 34 p.

Parker, D.F., and McDowell, F.W., 1979, K-Ar geochronology of Oligocene volcanic rocks, Davis and Barrilla Mountains, Texas: Geol. Soc. America Bull., Part 1, v. 90, p. 1100-1110.

Wilcox, R.E., and Langston, W., Jr., 1986, The non-marine Bissett Formation of the western Glass Mountains, Trans-Pecos Texas: evidence for an early Cretaceous (Neocomian?-Albian) age: Geol. Soc. America, South-Central and Southeastern Section, Abstracts with Programs, p. 272.

Location Map



Graphic from source map: Fort Stockton Sheet (revised 1994)

Map Credits

Virgil E. Barnes, Project Manager.

Geologic Mapping in part from sources shown on index map. Mapping received from Humble Oil & Refining Company, Mobil Oil Company, Geophoto Service, Inc., and Cities Services Petroleum Company gratefully acknowledged. Geology of unmapped areas and contributed mapping compiled and field checked by J.E. Anderson, Jr., J.B. Brown, J.C. Gries, E.M.P. Lovejoy, and Dawn McKalips, using high-altitude aerial photographs. Mapping compiled and scribed by R.L. Dillon. Mapping reviewed by West Texas Geological Society, Geologic Atlas Committee, R.W. Stump (Consultant Geologist), Chairman, Johnnie B. Brown (Consultant Geologist), and Bruce T. Pearson (Independent Geologist); and by Ronald K. DeFord, Keith Young, Daniel S. Barker, and Fred W. McDowell, Department of Geological Sciences, The University of Texas at Austin. Cartography for revision by B. M. Hartmann.

Text from source map: Fort Stockton Sheet (revised 1994)

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 Stephanie O'Meara.

The information in this document was compiled from the GRI source map, and intended to accompany the digital geologic-GIS map and other digital data for Fort Davis National Historic Site, Texas (FODA) developed by Phillip Reiker (NPS GRD, Lakewood, Colorado) and Stephanie O'Meara (see the GRI Digital Map and Source Map Citation section of this document for the source map used by the GRI in the completion of this document and related GRI digital geologic-GIS map).

GRI finalization by Stephanie O'Meara (Colorado State University).

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