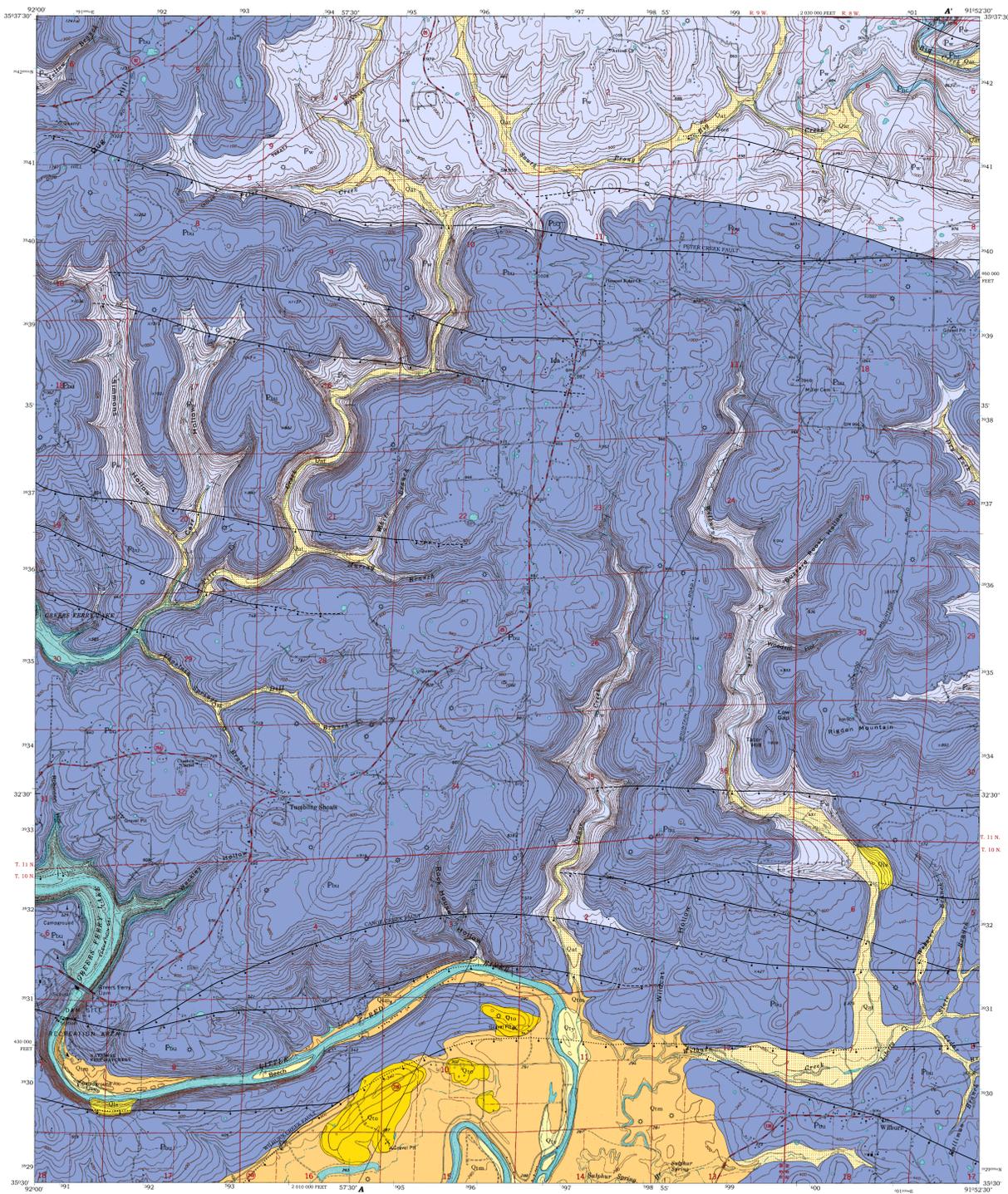
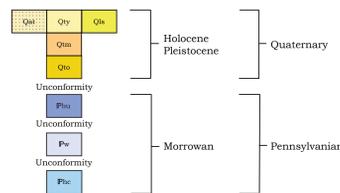


Geologic Map of the Greers Ferry Dam Quadrangle, Cleburne County, Arkansas

John M. Thomas and John T. Gist
2025
Scott M. Ausbrooks, Director and State Geologist



Correlation of Map Units

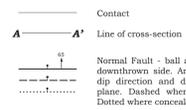


Location of the Greers Ferry Dam quadrangle on the Boston Mountains Plateau in the Ozark Plateaus Physiographic Province.

Introduction

This map depicts the bedrock and surficial geology of the Greers Ferry Dam 7.5-minute series USGS topographic quadrangle in Cleburne County, Arkansas. Approximately 820 feet (250 meters) of Early Pennsylvanian (Morrowan) classic rocks are exposed. The mapping area is situated in the Interior Highlands Region on the southern flank of the Boston Mountains Plateau, the southernmost and highest of a series of plateau surfaces within the Ozark Plateaus Province. The Boston Mountains Plateau is developed on mostly early Pennsylvanian-aged sandstone, siltstone, and shale. The upper part of the Bloyd Formation, Wits Springs Formation, and Cane Hill member of the Hale Formation comprises the bedrock for the quadrangle. Generally, sandstone units, separated by poorly exposed intervals of shale and siltstone, have eroded to form typical bench and bluff topography due to differential weathering. These rocks consist of sediments deposited in near-shore marine, deltaic, and fluvial environments. In 1962, the U.S. Army Corps of Engineers completed a dam at Heber Springs which flooded the valley of the Little Red River upstream and created Greers Ferry Lake, a major geographic feature in this area. Below the dam, Quaternary terrace and alluvium deposits are present along the Little Red River, and in a wide valley shaped by the river's course and faulting, the river has developed older, medial, and younger terrace levels. The major tributaries of the Little Red River within the mapped area are Canoe Creek and Wilburn Creek in the eastern portion and Big Creek in the northeastern portion of the quadrangle. Peter Creek, in the western part of the quadrangle, flows into Greers Ferry Lake. These streams constitute the main drainage systems in the area. Regionally, strata dip slightly to the south, away from the core of the Ozark Dome in southeastern Missouri, however, dip is locally variable due to normal faulting and monoclines. Several normal faults are depicted on the map, three of which have been named. The Peter Creek fault and Canoe Creek fault are east-west trending, down-to-the-south normal faults, with offsets of approximately 80-100 feet (24-30 meters) and 100 feet (30 meters), respectively. The Wilburn Creek fault is a down-to-the-south normal fault that transitions from southwest-northeast to east-west as it nears the Little Red River. The Wilburn Creek fault lacks stratigraphic markers, so the amount of offset is unknown. Previous studies of this area include J. T. Vest's 1962 delineation of Morrowan-aged stratigraphy and paleontology of the Greers Ferry reservoir and E. E. Glick's 1973 geologic worksheet drawn at the 1:250,000 scale in preparation for the Geologic Map of Arkansas. This map builds on that previous work and depicts the structure and stratigraphy in greater detail. The contacts and structural features displayed are based primarily on field observations made from July 2024 to April 2025. Representative rock samples were collected from the field area and described in detail. Data and site locations were recorded on a portable GPS data collector and integrated into a geodatabase.

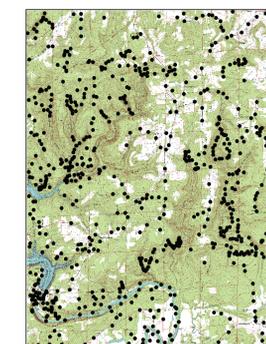
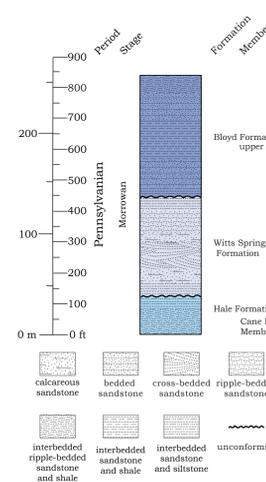
Symbols



Description of Map Units

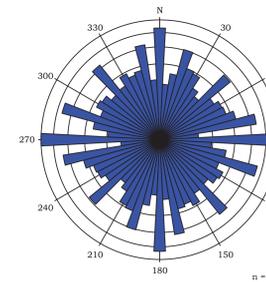
- Alluvium and terrace deposits (Quaternary)** – unconsolidated clay, silt, sand, and gravel, including deposits on one or more terrace levels along larger streams.
- Landslide deposits (Quaternary)** – a mass of rock and debris that has moved downslope due to gravity. Only the largest landslide deposits are depicted.
- Young terrace and active channel deposits (Quaternary)** – unconsolidated clay, silt, sand, and gravel in gravel bars and sandy point bar deposits along the Little Red River and in the youngest terrace above the river. Ranges from 10-20 feet (3-6 meters) above river.
- Medial Terrace and alluvial deposits (Quaternary)** – unconsolidated clay, silt, sand, and gravel in a higher terrace along the Little Red River. Ranges from 30-40 feet (9-12 meters) above river.
- Old Terrace and alluvial deposits (Quaternary)** – unconsolidated clay, silt, sand, and gravel deposited by the Little Red River. Gravel is typically rounded and medium pebble to small boulder in size. Up to 60 feet (18 meters) above river.
- Bloyd Formation – upper part (Lower Pennsylvanian, Morrowan)** – consists of interbedded sandstone, siltstone, and shale. The sandstone is generally very fine to fine grained and micaceous, but locally grain sizes can range from very fine to coarse. Bedding is commonly thin to medium and irregular to horizontal. Locally well indurated, contains abundant iron, and exhibits ripple bedding, cross bedding, and lenticular banding. Buff to light brown on fresh surfaces, but weathers dark to light brown with a massive, rounded appearance. Locally contains rounded milky quartz pebbles and granules, clay pebbles, pebble molds, shale partings, trace fossils, and fossil wood casts and molds. Sparse intervals contain fossil molds including crinoids, brachiopods, and gastropods. Shale is generally poorly exposed but is clay to silty. Dark gray to black on fresh surfaces and weathers light gray to tan. Siltstone is very finely bedded, light brown to tan on fresh surfaces but weathers brown to grayish brown. Sparse conglomeratic zones interbedded with shale and siltstone are commonly calcareous and contain very fine to coarse-grained quartz sand, milky quartz pebbles, clay pebbles, iron pebbles and concretions, and abundant fossil fragments. Unconformable with the underlying Wits Springs Formation. Up to 380 feet (116 meters) thick.
- Wits Springs Formation (Lower Pennsylvanian, Morrowan)** – predominantly sandstone with minor units of limy sandstone. Shale and siltstone units are commonly interbedded. Sandstone is commonly fine grained but locally ranges from very fine to medium and is friable with iron case hardening. Sandstone is typically thin to thick-bedded, but locally thin- to medium-bedded. Weathering commonly masks bedding, giving the sandstone a massive and rounded or blocky appearance. Reddish orange to orangish brown or buff on fresh surfaces, weathers brown to dark brown. A prominent bluff-former, it locally contains joint caves and bluff shelters. Typical sedimentary features include cut-and-fill structures, cross bedding, ripple bedding, and soft sediment deformation. Lenticular banding, stylolites, and honeycomb weathering are common. Locally contains pebble molds, shale pebbles, trace fossils, and fossil wood prints and molds. Sparse zones of limy sandstone contain fossil fragments including crinoids, brachiopods, gastropods, and corals. Locally, conglomeratic intervals present throughout the formation contain milky quartz pebbles and granules, shale pebbles, iron concretions, and fossil fragments. Shale and siltstone units are light to dark gray or black on fresh surfaces and weather tan to light brown. Unconformable with the underlying Cane Hill member of the Hale Formation. Up to 320 feet (97 meters) thick.
- Hale Formation (Lower Pennsylvanian, Morrowan)** – consists of two members, the Prairie Grove and the Cane Hill. Only the Cane Hill is present on this quadrangle. Rocks equivalent to the Prairie Grove and the lower part of the Bloyd Formation are mapped as the Wits Springs Formation. **Cane Hill Member** – primarily consists of sandstone interbedded with shale and siltstone. Sandstone is very thin to medium bedded and commonly flaser, ripple, and cross bedded. Typically very fine to fine grained and locally silty and micaceous. Commonly buff to tan on fresh surfaces, but weathers grayish brown to dark brown. Locally contains shale pebbles and partings. Shale is rarely exposed but is clay to silty. Weathers orangish brown to tan and is gray to black on fresh surfaces. Siltstone is tan to brown or gray on fresh surfaces, but weathers to dark brown. Up to 120 feet (36 meters) thick.

Stratigraphic Column



Topographic map of the Greers Ferry Dam quadrangle showing locations of data collection points.

Joint Frequency



Rose diagram of the strike frequency of joints recorded on the Greers Ferry Dam quadrangle.

References

- Glick, E.E., 1973, Partial geologic map of the Memphis quadrangle: Arkansas Geological Commission, Geologic Worksheet, 1 sheet, 1:250,000.
- Vest, J.T., 1962, Morrowan strata of the Greers Ferry Dam reservoir area: University of Arkansas master's thesis, 124p., 2 plates.

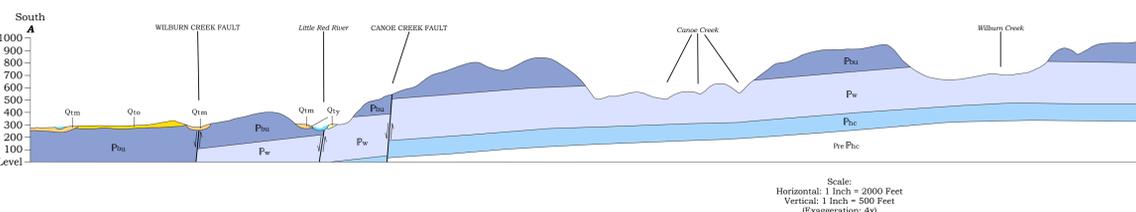
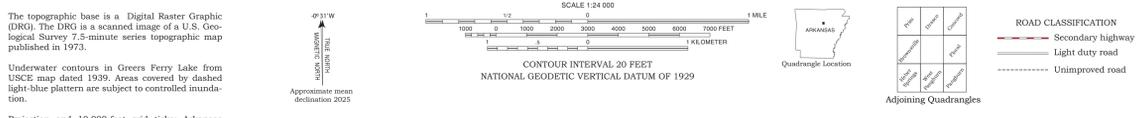
Acknowledgements: This map was produced for the STATEMAP grant program administered by the U.S. Geological Survey under Cooperative Agreement Award G24AC000328. Special thanks to Potuchik, Green Bay Packaging, Faust Forestry Management, and the private landowners who graciously allowed access to their properties. A very special thanks to Richard Hutto for serving as principal investigator and providing mapping assistance on this mapping project.

Limitations: This map, like all geologic maps, is based on interpretations which were made from the data available at the time it was created. As new information is collected, the features depicted on this map may be changed.

For the latest edition of this and other maps and publications from the Office of the State Geologist, please call Publication Sales at 501-296-1877 or visit our office at 5301 Northshore Drive, North Little Rock, AR 72118. This map is also available at: <https://www.geology.arkansas.gov/maps-and-data/geologic-maps/geologic-quadrangle-maps-for-arkansas-1-24k-scale.html>

Suggested citation for this map: Thomas, J.M. and Gist, J.T., 2024, Geologic map of the Greers Ferry Dam quadrangle, Cleburne County, Arkansas: Office of the State Geologist, Digital Geologic Map, DGM-AR-00353, 1 sheet, 1:24,000.

Map and cross-section digitized by Brian Keher.



Wits Springs conglomeratic foot containing abundant milky quartz pebbles and granules in Carr Hollow.



Interbedded sandstone and shale in the upper part of the Bloyd Formation near the dam site recreation area.



Ripple bedded upper Bloyd sandstone exposed in a drainage ditch near the Little Red River.