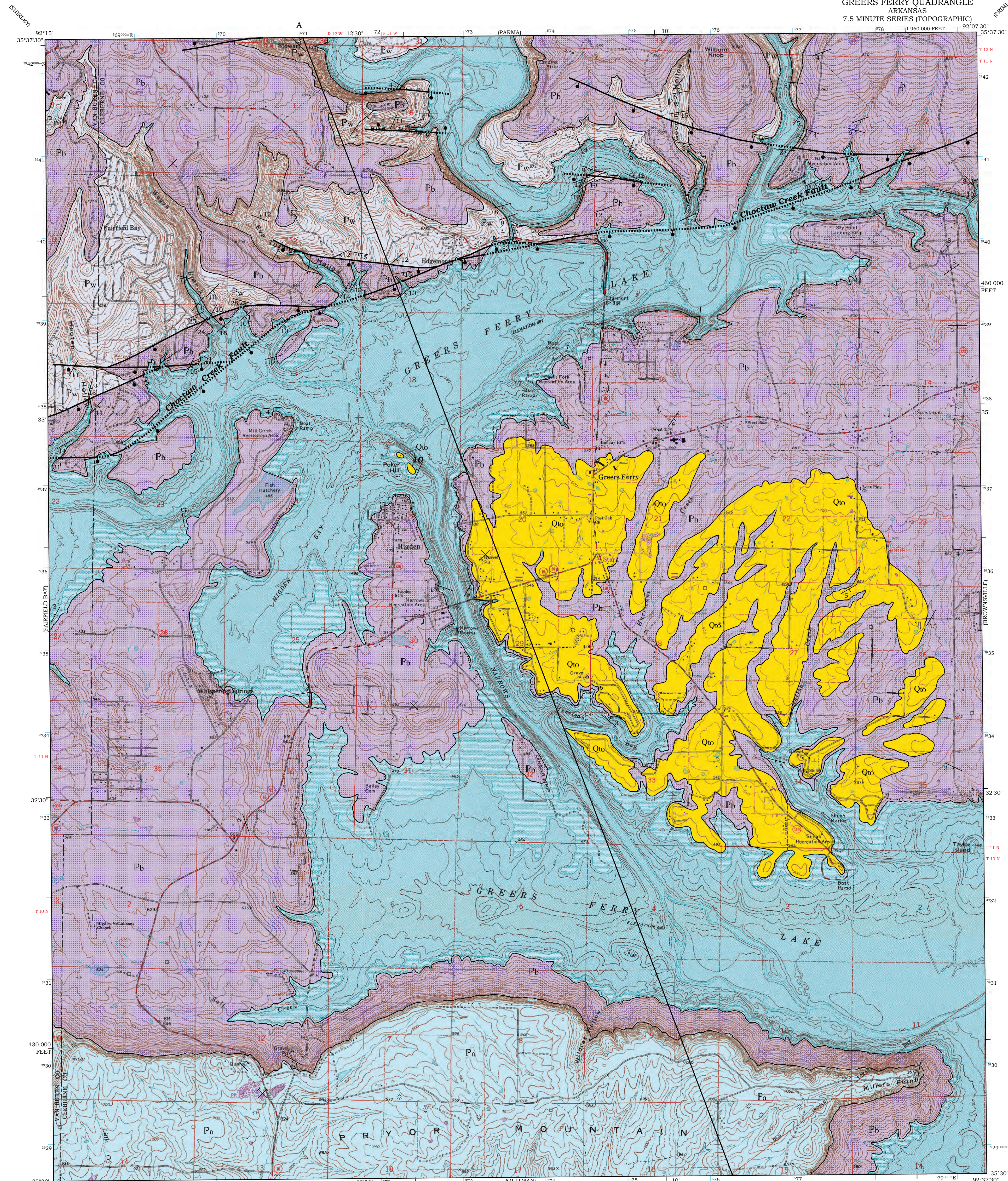


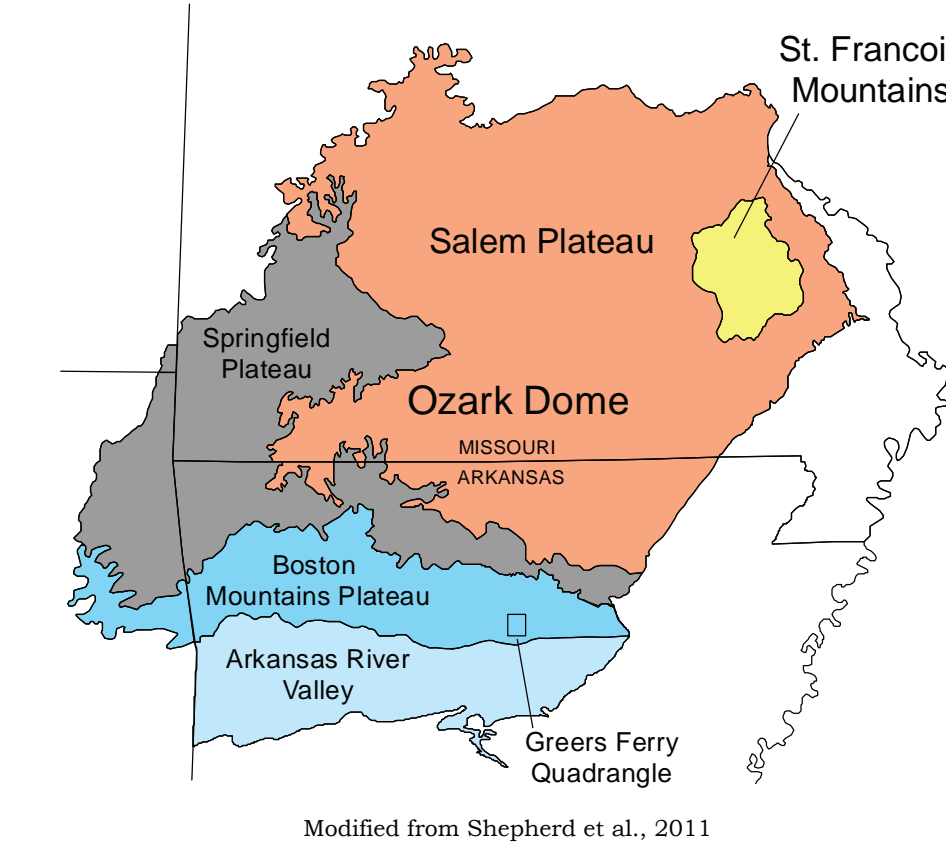
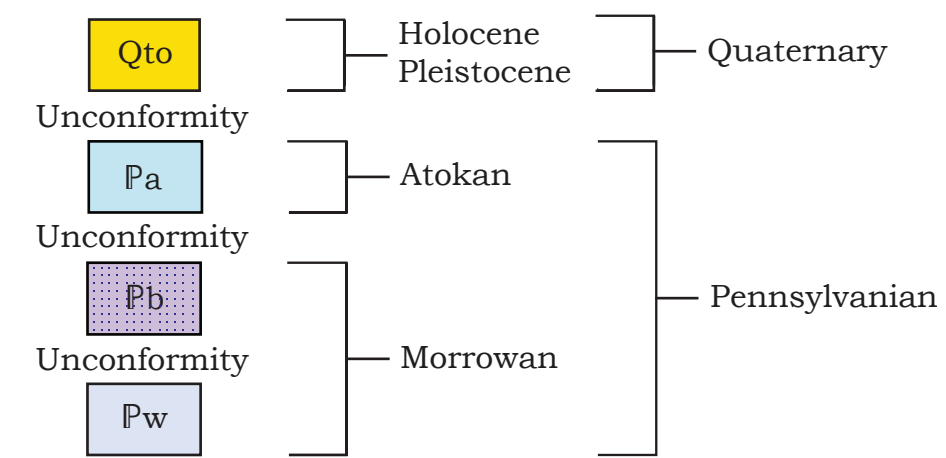
Geologic Map of the Greers Ferry Quadrangle, Cleburne and Van Buren Counties, Arkansas

Richard S. Hutto and Ty C. Johnson
2015

GREERS FERRY QUADRANGLE
ARKANSAS
7.5 MINUTE SERIES (TOPOGRAPHIC)
1:500,000 FEET



Correlation of Map Units



Introduction

This map depicts the bedrock and surficial geology of the Greers Ferry 7.5-minute quadrangle. In this area, approximately 1230 feet (375 meters) of Early Pennsylvanian (Morrowan) clastic sediments were deposited in near-shore fluvial and deltaic environments. Regionally, the mapped area is situated on the southern flank of the Boston Mountains Plateau. This is the southernmost of a series of plateau surfaces called the Ozark Plateaus. Structurally, the Ozark Plateaus is controlled by an area of uplift centered in the St. Francois Mountains of southeast Missouri known as the Ozark Dome. The Boston Mountains Plateau is the highest of these plateau surfaces and is developed on mostly Pennsylvanian rocks. Characteristic bench and bluff topography is due to differential weathering of the sandstone and shale units. Strata dip an average of about one degree to the south.

The Choctaw Creek Fault is the major structural feature on the map. It is a normal fault with a throw of approximately 200 feet (61 meters) down to the south. Topography displays higher relief north of this fault and is more subdued to the south. Overall, relief is about 800 feet (244 meters).

In 1962, the U.S. Army Corps of Engineers completed a dam at Heber Springs that flooded the valley of the Little Red River upstream including much of the area of this quadrangle. Greers Ferry Lake is now the dominant geographic feature in the area. A watergap known as the Narrows runs between Higgins and Greers Ferry and divides the lake into a northern and southern portion. The shape of the northern portion of the lake is controlled by the Choctaw Creek Fault. A large, stranded terrace on the east side of the Narrows was deposited by the Little Red River as it cut downward and westward from an elevation at least 400 feet higher than its current channel before inundation.

The geology of this area was mapped circa 1973 by E. E. Glick at the 1:100,000 scale for the Geologic Map of Arkansas. This map uses a more comprehensive stratigraphy and depicts structural features in greater detail. The contacts and structures are based primarily on field observations made from July 2014 to April 2015. Locations of data collection sites were recorded with a global positioning satellite receiver.

Description of Map Units

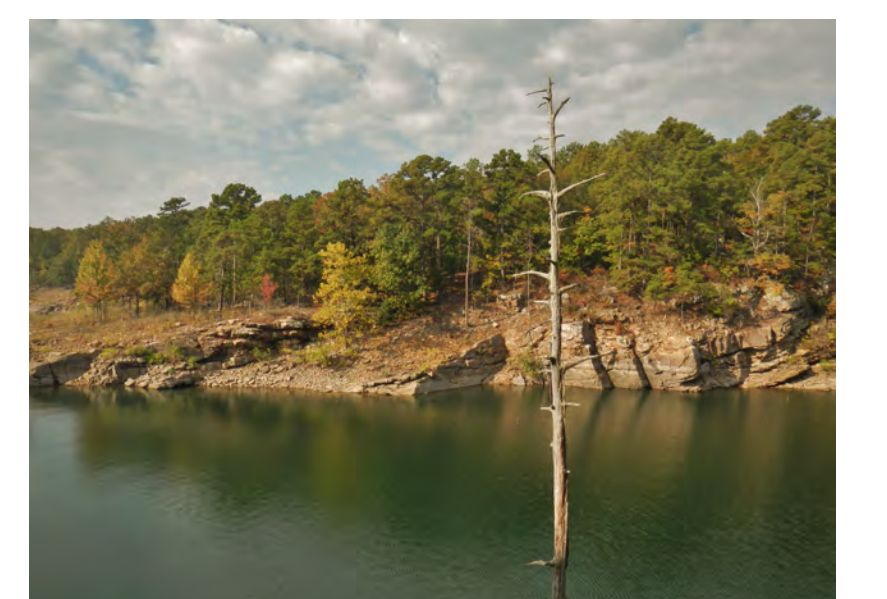
- Qto** **Very old terrace and alluvial deposits (Quaternary)** - Unconsolidated clay, silt, sand, and gravel in discontinuous, inter-tonguing beds underlying a significant portion of the town of Greers Ferry. Gravel consists of well rounded, fine grained, locally polished sandstone in a sandy clay matrix. Typically pebble to cobble sized, but ranges to boulder sized. Boulders are locally sub-angular. Tan on fresh surfaces, but weathers dark orange. Matrix material is dark orange and locally mottled with gray. Lenses of sandier material are tan. Up to 20 feet (6 meters) thick.
- Pa** **Atoka Formation (Lower Pennsylvanian, Atokan)** - consists of sandstone interbedded with shale and siltstone. Sandstone is thin to thick bedded and very fine to fine grained. Commonly exhibits thickening and coarsening upward sequences. Brown to orange on fresh surfaces, but weathers tan. Locally contains trace fossils and ripple marks. Shale is typically dark gray on fresh surfaces, but weathers tan. Siltstone is tan on fresh surfaces, but weathers brown. Unconformable with the Bloyd Formation. Up to 280 feet (85 meters) are exposed.
- Pb** **Bloyd Formation - undifferentiated (Lower Pennsylvanian, Morrowan)** - consists of interbedded sandstone, siltstone, and shale. Sandstone is medium to thick bedded and typically flat to lenticular. Very fine to fine grained and, less commonly, medium grained. Typically orange but locally tan, red, and white on fresh surfaces. Weathers light brown to dark brown. Displays ripple bedding, cross-bedding, and soft-sediment deformation. Locally contains spherulites, acorn-and-til structures, shale-partings, and fossil wood casts and molds. Locally micaceous. Contains shale and/or quartz pebbles, ironstone concretions, boxwork, leese-gang banding, and trace fossils. Sandstone units are typically 20 to 80 feet (6 to 24 meters) thick. Shale is dark gray and siltstone is tan on fresh surfaces. Both weather tan to orange. Unconformable with the Wits Springs Formation. Up to 340 feet (104 meters) are exposed.
- Pw** **Wits Springs Formation (Lower Pennsylvanian, Morrowan)** - consists of sandstone, limy sandstone, sandy limestone, and minor amounts of shale and siltstone. Sandstone is typically thin to thick bedded and commonly cross bedded. Weathering commonly masks bedding so that it appears massive, and rounded or blocky. Locally exhibits soft-sediment deformation and overturned cross-beds. Rockshelters are common at the base of massive sandstone bluffs. Exfoliation of massive sandstone along stream beds produces a characteristic concave reentrant. Sandstone is typically fine grained, but locally medium to coarse. Orange to buff on fresh surfaces but weathers gray to brown, or orange and friable. Commonly contains quartz pebbles, shale pebbles, and trace fossils. Liesegang banding and honeycomb weathering are common. Locally contains fossil wood casts and molds (some coalified), coal stringers, and thin coal beds. Wood prints include both *Calamites* and *Leptodendron*. Discontinuous units up to 100 feet (30 meters) thick composed of fine-grained, interbedded limy-sandstone and sandy limestone are deeply solutioned, cross bedded, and fossiliferous. Fossil fragments include: brachiopods, crinoids, and rugose corals. Gray to brown on fresh surfaces but weathers brown to dark brown. Shale units are commonly interbedded with siltstone. Both are dark gray to black on fresh surfaces but weather tan to orange. Unconformable with the Cape Hill Member of the Hale Formation. Up to 440 feet (134 meters) are exposed.



Normal fault within the Bloyd Formation in old railroad cut near Edgemont. Fault trace shows as white line.

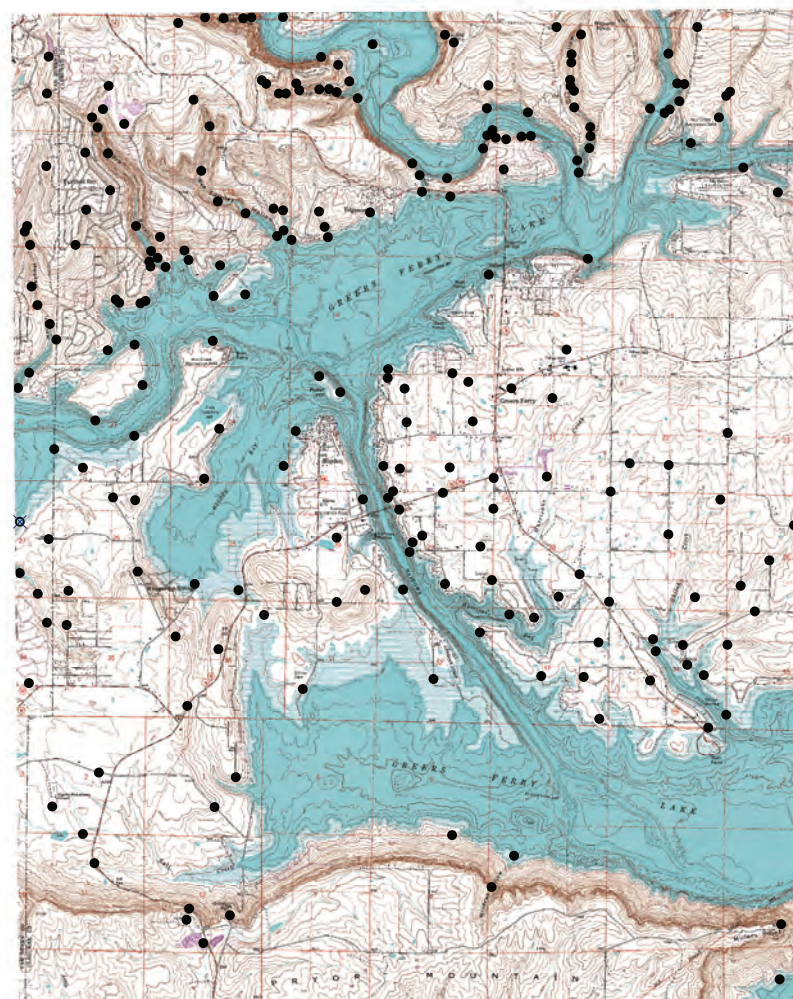
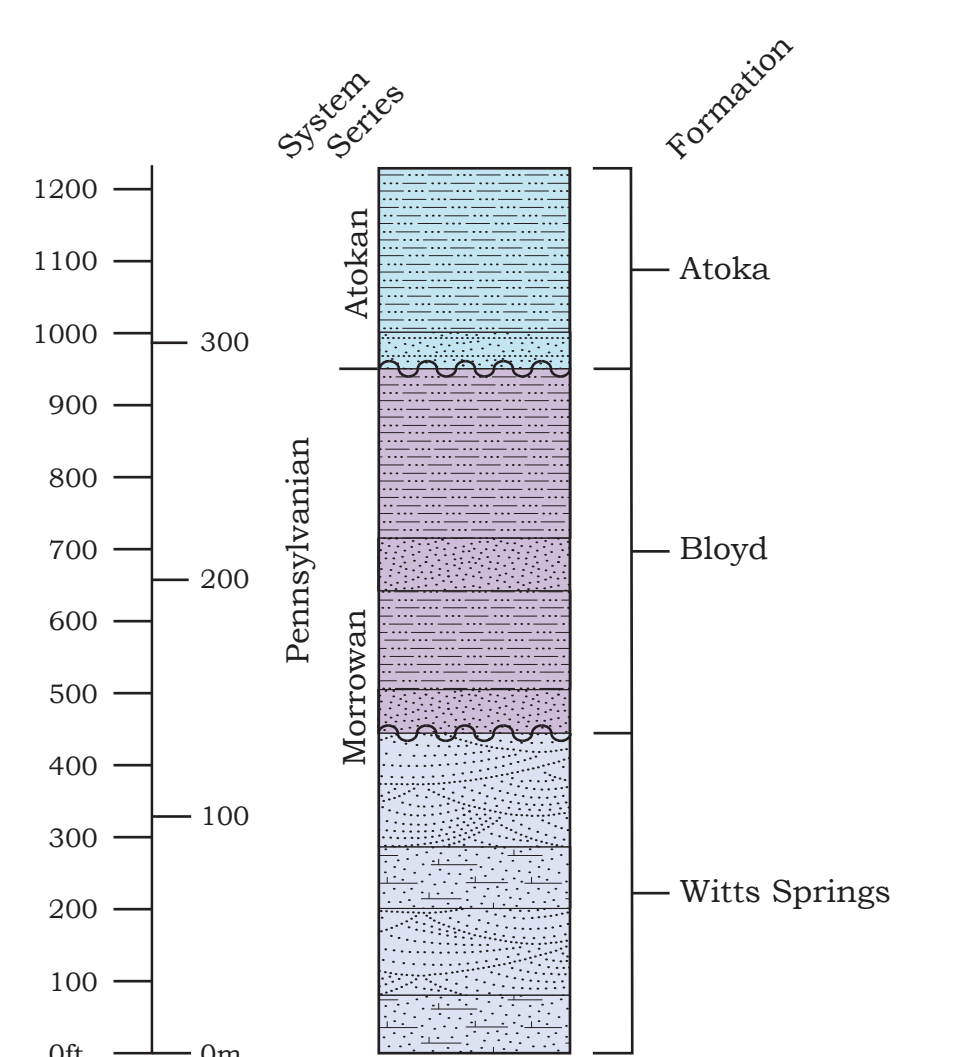


Old terrace deposit in town of Greers Ferry.



Sandstone in the Bloyd Formation dipping into Choctaw Creek Fault in Wagon Branch Hollow.

Stratigraphic Column



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

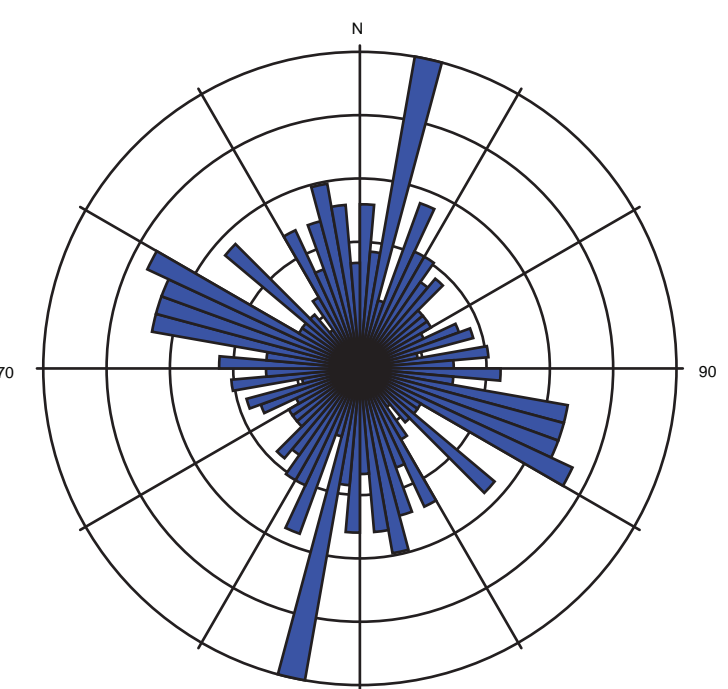


Natural amphitheater known as Indian Rock House in Bloyd Formation, Fairfield Bay.

Symbols

- Contact
- Normal fault (dotted where concealed bar on downthrown side)
- Inclined bedding showing direction and magnitude of dip
- Gas Well
- Gravel Pit
- Quarry
- Line of cross-section

Joint Frequency



Rose diagram of strike frequency of joints recorded within the Greers Ferry quadrangle

References

- Glick, E. E., 1973. Partial geologic map of the Batesville quadrangle, Arkansas: Arkansas Geological Survey, Geologic Worksheet, 1 sheet, 1:100,000
- Shepherd, S. L., Dixon, J. C., and Davis, R. K., 2011. Are Ozark streams underfit? Using GIS to re-examine Dury's theory of underfit streams: *Physical Geography*, v. 32, no. 2, pp. 179 - 194.
- Vest, J. T., 1962. Morrowan Strata of the Greers Ferry Reservoir Area, University of Arkansas, master's thesis, 124 p., 2 plates

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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 work continues and new data is collected, the contacts and structures depicted on this map may be changed.

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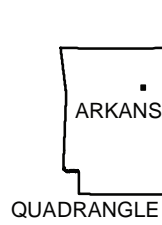
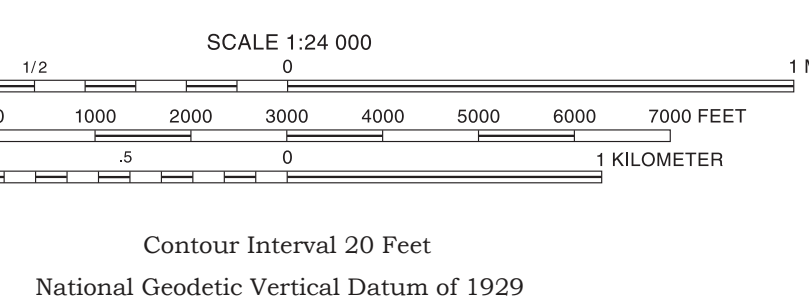
http://www.geology.ar.gov/geologic_maps/dgm24k.htm

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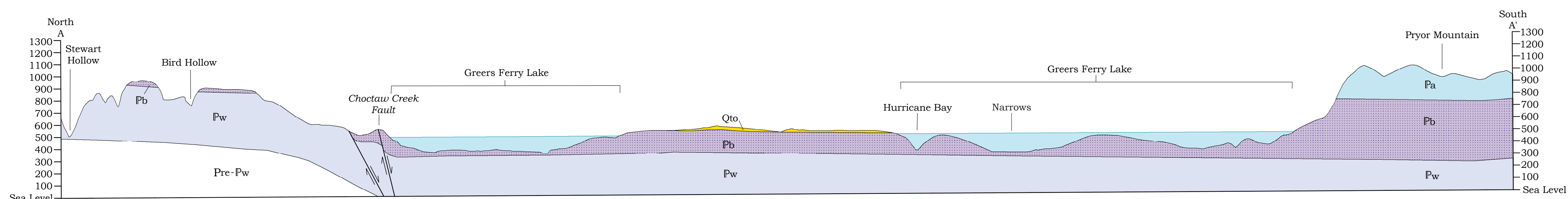
Map digitized by Nathan Taylor and cross-section digitized by Jerry Clark.

The topographic base is a Digital Raster Graphic (DRG). The DRG is a scanned image of a U.S. Geological Survey standard series topographic map published in 1973 and photorevised in 1981.
Projection and 10,000-foot grid ticks: Arkansas coordinate system, north zone (Lambert conformal conic).
1000-meter Universal Transverse Mercator grid ticks, zone 15, shown in blue. 1927 North American datum.

Approximate mean declination 2015



- Road Classification
- Secondary highway
- Light duty road
- Unimproved road
- State Route



Geologic Cross-Section A-A'

Scale: Horizontal: 1 inch = 2000 feet
Vertical: 1 inch = 500 feet (4X exaggeration)