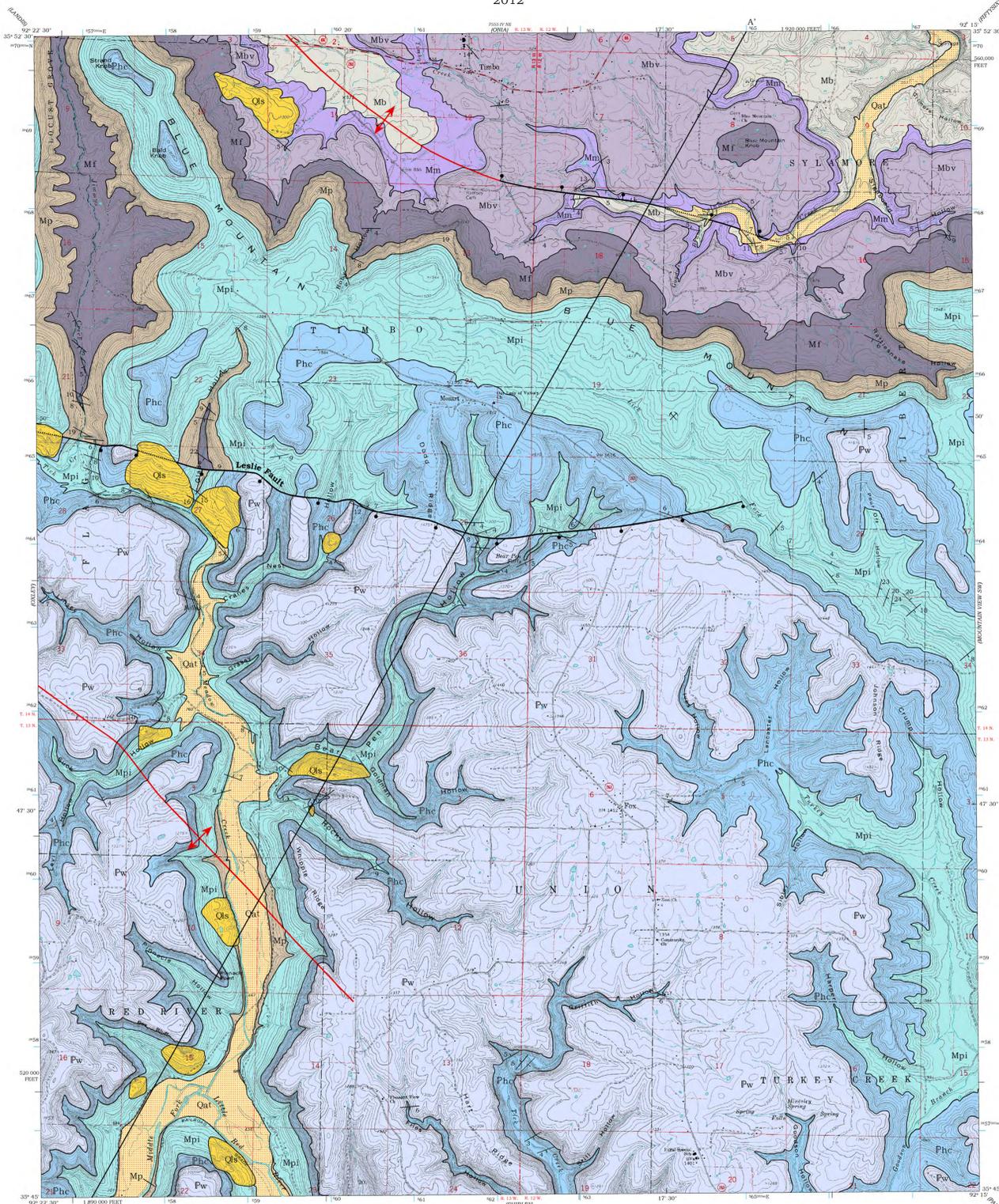
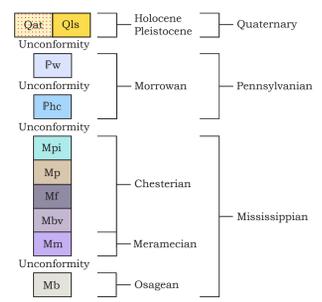


# Geologic Map of the Fox Quadrangle Stone County, Arkansas

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2012



## Correlation of Map Units



## Introduction

This map graphically summarizes the bedrock geology of the Fox 7.5-minute quadrangle. In this area over 1,300 feet (396 meters) of Lower Pennsylvanian to Lower Pennsylvanian carbonate and clastic sedimentary rocks are exposed. Regional structure of the area is controlled by an uplift centered in southeast Missouri known as the Ozark Dome. From that area southward into Arkansas, progressively younger rocks form a series of increasingly elevated plateau surfaces known as the Ozark Plateaus Region. This map is situated on the northern edge of the Boston Mountains Plateau and the southern edge of the Springfield Plateau. They are divided by a prominent escarpment.

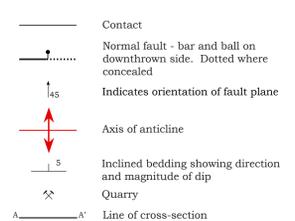
The largest structure on this map is the eastern end of the Leslie Fault, which trends mostly east-west from its western end on the Marshall quadrangle, across Canaan, Leslie and Osley quadrangles to Lick Fork, a distance of approximately 29 miles (47 kilometers). It is a normal fault downthrown to the south with a maximum displacement of 340 feet (104 meters). Smaller structures include an east-west trending normal fault downthrown to the north along South Sylamore Creek with up to 80 feet of offset. This fault dies out into an anticline to the northwest that raises the Boone Formation above the Moorefield Formation. The anticline across Meadow Creek is probably the surface expression of a northwest/southeast trending splay off the Leslie Fault that dies out to the west on the Osley quadrangle. The largest drainage in this area is the Middle Fork of the Little Red River which is in the watershed of Greers Ferry Lake to the south.

The geology of this area was mapped in 1973 by E. E. Glick for the 1:500,000 scale Geologic Map of Arkansas. This map incorporates a revised stratigraphy and adds greater structural detail. The contacts and structural features were derived from field observations made from July 2011 through April 2012. Site locations were generated with the aid of a global positioning satellite receiver. Bedrock dipping 2° or less

## Description of Map Units

- Qat** Alluvium and terrace deposits (Quaternary) - unconsolidated clay, silt, sand and gravel, intermittently deposited along larger streams. Includes deposits on one or more large terrace levels.
- Qls** Landslide deposits (Quaternary) - a mass of rock and debris that has moved downslope as a result of destabilization and subsequent failure of surficial materials.
- Pw** Wits Springs Formation (Lower Pennsylvanian, Morrowan) - a variable sequence of sandstone, siltstone and shale. Sandstone is typically medium- to very thick-bedded, massive, very fine- to medium-grained and rarely, coarse-grained. Locally crops out as a package of stacked, thin- to medium, cross-bedded channel sands. It ranges from orange to brown, white to buff and tan to light-gray on fresh surfaces, and weathers dark-orange to dark-brown. Typically displays leopards banding, honeycomb weathering and fossil molds. Locally calcareous, micaceous and friable. Intervals of shale, quartz and sandstone-pebble conglomerate are common. Massive sandstone units are typically separated by units of clay to silt shale, siltstone and very thin- to thin-bedded, ripple- to flat-bedded, very fine- to fine-grained sandstone. Unconformable with the underlying Cane Hill Member. Up to approximately 380 feet (116 meters) thick.
- Phc** Hale Formation (Lower Pennsylvanian, Morrowan) - consists of two members: the Prairie Grove Member and the Cane Hill Member. Only the Cane Hill is present on this quadrangle. Rocks equivalent to the Prairie Grove are mapped in the Wits Springs Formation.
- Cane Hill Member** - typically silt to clay shale that contains flattened ironstone nodules and discontinuous, thin-bedded, laminitic siltstone that weathers to form boxwork. Fresh exposures are dark-gray to black, and weather tan to light-orange-brown. Units of very thin- to thin-, ripple-bedded, very fine- to fine-grained, micaceous silty sandstone with shale partings are common throughout. Near the base is an especially persistent unit of this type that is usually light- to dark-gray on fresh surfaces and weathers tan or dark-gray to dark-brown. It ranges from 40-80 feet (6-24 meters) in thickness, and weathers to a flaggy columnar that is extensively collected for building stone. Unconformable with the underlying Imo shale. Total thickness ranges from 180-220 feet (55-98 meters).

## Symbols



**Pitkin Formation (Upper Mississippian, Chesterian)** - informally divided into two members: the Imo shale and the Pitkin Limestone (Smith and Hutto, 2007).

**Imo shale** - consists mostly of shale with intermittent sandstone units. Shale ranges from light-gray, calcareous to dark-gray, non-calcareous and locally contains abundant fossils. Fossils include brachiopods (commonly nuculoid), cephalopods (commonly ammonoids and conical nautiloids), solitary corals (commonly rugose), crinoids, brachiopods, gastropods, trilobites and plant material. Amorphous and crystalline pyrite are commonly associated with the fossiliferous zones. Discontinuous, orange to dark-red, fossiliferous sandy limestone beds are common in the upper part. Spherical, non-fossiliferous ironstone concretions, either solitary in shale or adhered to sandstone bedding surfaces, are common throughout. Tempestites, composed of solitary or loosely accreted crinoid stems and typically associated with light-gray calcareous shale, locally weather out of the lower part. A persistent, fine- to medium-grained, thin- to massive and locally cross-bedded sandstone unit with a thickness of approximately 15-40 feet (5-12 meters) typically crops out within 40-60 feet of the base. Fresh surfaces are buff to tan and locally mottled or banded with dark-red iron blebs. Weathers dark-orange-brown to gray, and blocky. Commonly exhibits pronounced stylolites, lieegang banding and honeycomb weathering. Conformable with the underlying Pitkin Limestone. Ranges from 160-260 feet (49-79 meters) in thickness.

**Pitkin Limestone** - a thin- to very thick, massive-bedded, fine- to coarse-grained, locally oolitic bioclastic limestone. Upper half contains discontinuous, black shale intervals. The limestone contains abundant fossils including crinoid fragments, the bryozoan *Archimedes*, corals, nautiloids, brachiopods, gastropods, and trilobites. Fresh surfaces are light- to dark-gray and usually petrioliferous. Weathers light- to medium-gray. Is commonly cross-bedded near the upper contact, and grades to a tan color due to an increase in silt content. Conformable with the underlying Fayetteville Shale. Ranges from 140-260 feet (43-79 meters) in thickness.

**Fayetteville Shale (Upper Mississippian, Chesterian)** - a black clay shale which is increasingly interbedded with thin- to medium-bedded, dark-gray, micritic to finely crystalline limestone in its upper part. Shale forms only very thin partings between the beds of micritic limestone near the upper contact. Also near the upper contact, nodular or discontinuous, thin-bedded black chert is commonly present. Mottled is usually petrioliferous and sparsely fossiliferous. Septarian concretions are common in the shaly units of the upper part, but isolated zones may be found in the lower part. Conformable with the underlying Boone Limestone. Ranges from 120-300 feet (37-91 meters) in thickness.

**Batesville Sandstone (Upper Mississippian, Chesterian)** - a thin- to medium-bedded, calcareous sandstone. Grains are very fine to medium, moderately well-sorted, and subangular. Fresh surfaces are light-gray to dark-brown, and weathers reddish-brown to tan to buff. Locally contains sandy limestone beds, cross-beds and fossil molds. Conformable with the underlying Moorefield Shale. Ranges from 60-100 feet (18-30 meters) in thickness.

**Moorefield Formation (Upper Mississippian, Meramecian)** - a silt shale with interbedded very thin- to thin-bedded siltstone. Shaly zones are usually dark-gray to black on fresh surfaces, but weather medium-gray to yellowish-brown. Siltstone is dark-gray to dark-brown on fresh surfaces, but weathers tan to buff. Locally the siltstone contains abundant brachiopods, usually near the upper contact. Unconformable with the underlying Boone Limestone. Ranges from 60-100 feet (18-30 meters) in thickness.

**Boone Formation (Lower Mississippian, Osagean)** - a finely to coarsely crystalline or coarse-grained fossiliferous limestone interbedded with anastomosing or lenticular chert. The limestone is medium gray on fresh surfaces, but weathers light- to dark-gray and locally contains abundant fossils, especially crinoid columnals and brachiopods. The chert is white to dark-gray on fresh surfaces, but usually weathers buff to white and tripolitic. Most of the unit is broken down into a regolith of angular chert fragments mixed with residual, reddish-brown clay. Sinkholes, springs, disappearing streams and other karst features are common. Reaches a maximum thickness of 200 feet (79 meters).

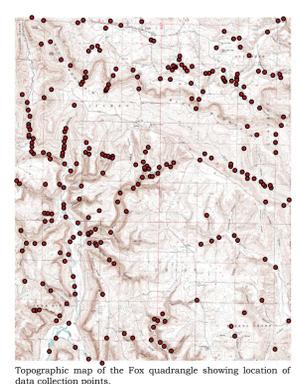
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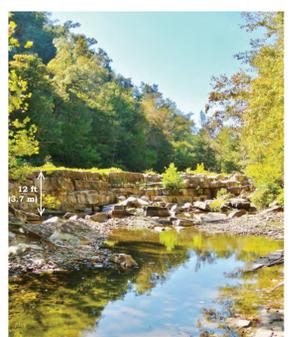
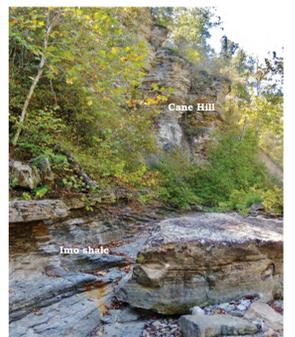
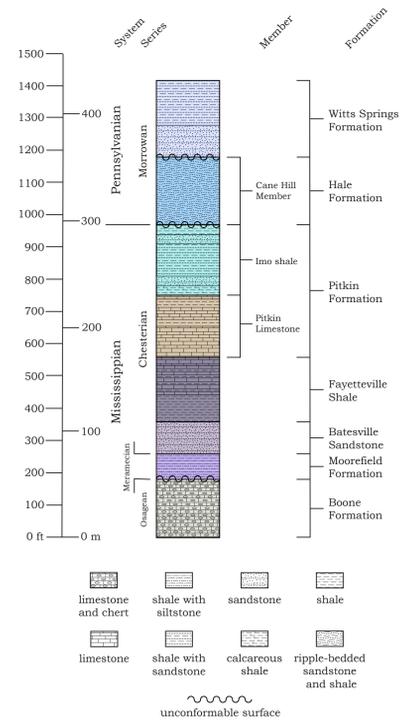
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## Stratigraphic Column



**Acknowledgments:** This map was produced for The National Cooperative Geologic Mapping Program (STATEMAP), a matching-funds grant program administered by the U.S. Geological Survey, under Cooperative Agreement Award G10AC00370. Special thanks to the private landowners who graciously allowed access to their properties. Very special thanks to Angela Chandler for writing the grant and serving as Principal Investigator. This map is dedicated to the memory of Walter K. Mayfield for the many years he assisted with StateMap projects.

**Disclaimer:** This map was digitized using ArcGIS ArcView 10 software on computers at the Arkansas Geological Survey (AGS). The AGS does not guarantee the accuracy of this map, especially when reproduced on any other system, with any other software or at a larger scale. As mapping continues and is refined, the data presented on this map may be updated.

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**Suggested citation for this map:**  
Hutto, Richard S. and Rains, Daniel S., 2012. Geologic map of the Fox quadrangle, Stone County, Arkansas. Arkansas Geological Survey, Digital Geologic Map, DGM-AR-00310, 1:24,000.

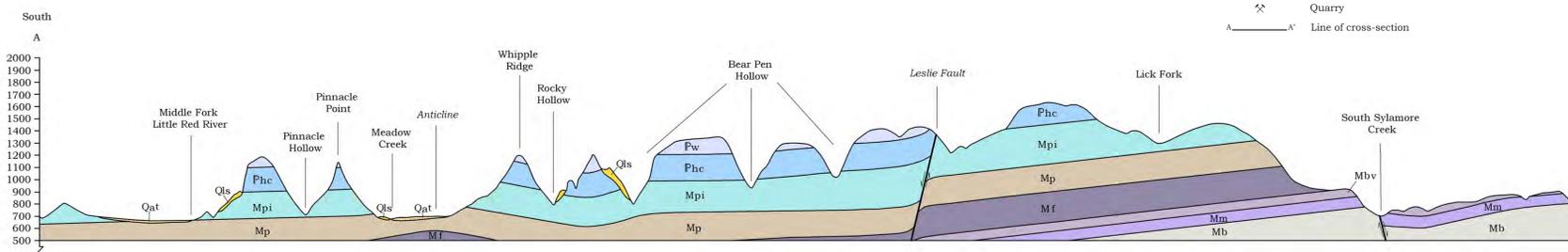
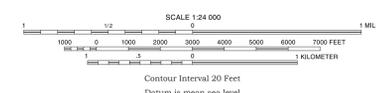
Map and cross-section digitized by Nathan Taylor.

The topographic base is a collated Digital Raster Graphic (DRG). The DRG is scanned from a U.S. Geological Survey standard series topographic map published in 1995. Some colors on the DRG have been modified.

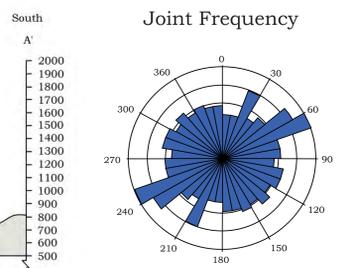
Polyconic projection, 1927 North American datum  
10,000-foot grid based on Arkansas coordinate system, north zone  
1000-meter Universal Transverse Mercator grid ticks, zone 15, shown in blue.

Fine red dashed lines indicate selected fence and field lines where generally visible on aerial photographs. This information is unchecked.

Approximate mean declination 2012



**Geologic Cross Section A - A'**  
Scale:  
Horizontal: 1 inch = 2000 feet  
Vertical: 1 inch = 500 feet (4x exaggeration)



Rose diagram of strike frequency of joints recorded within the Fox quadrangle