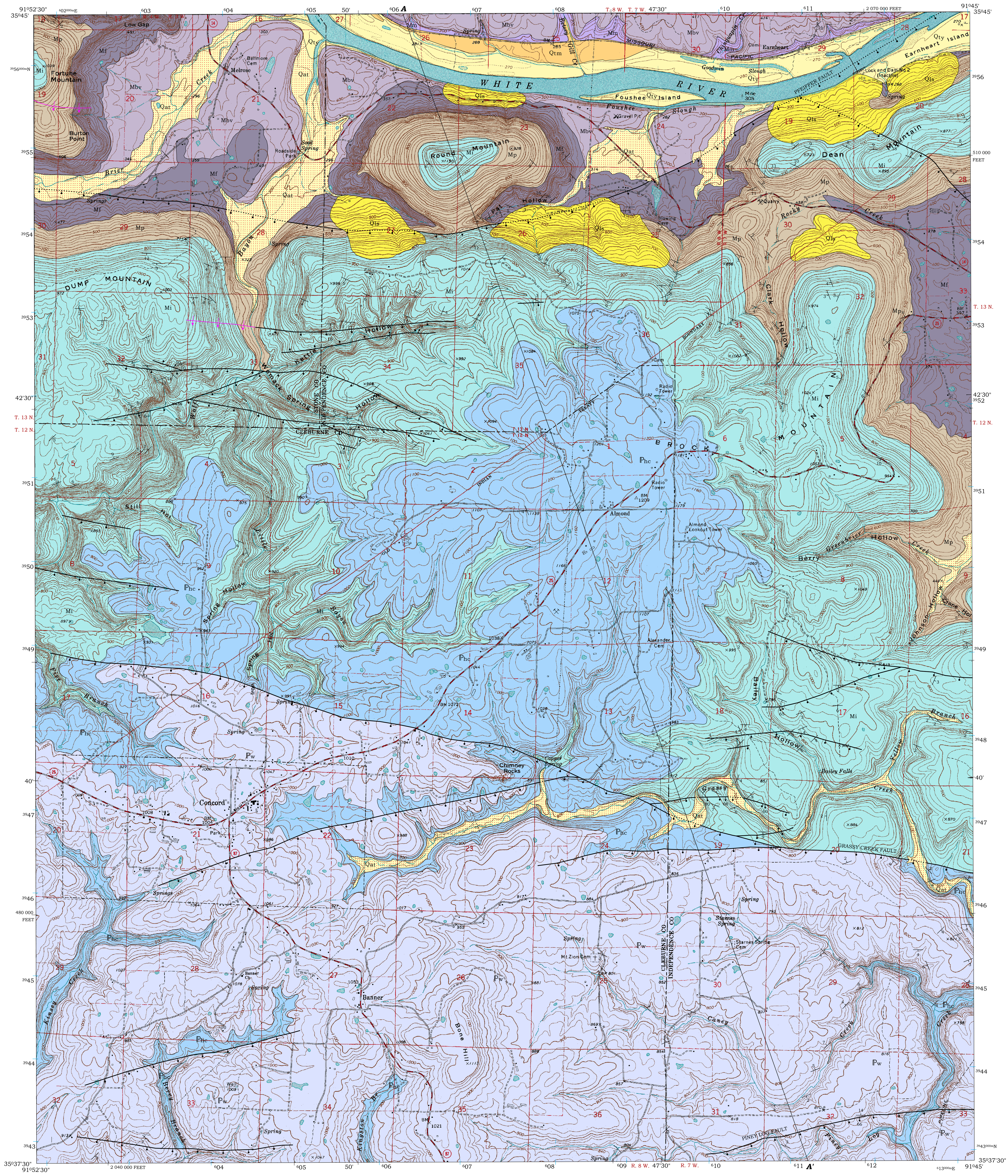
OFFICE OF THE STATE GEOLOGIST

Geologic Map of the Concord Quadrangle, Cleburne, Independence, and Stone Counties, Arkansas

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



This topographic base is a collarless Digital Raster Graphic (DRG). The DRG is a scanned image of a U.S. Geological Survey 7.5-minute series topographic map published in 1973.

10,000-foot grid based on Arkansas coordinate system, north zone.

1000-meter Universal Transverse Mercator grid ticks, zone 15. 1927 North American Datum.

-0° 31′W
TRUE NORTH
MAGNETIC NORTH
Approximate mean declination 2025

SCALE 1:24 000
1 MILE
7000 FEET
1 KILOMETER

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

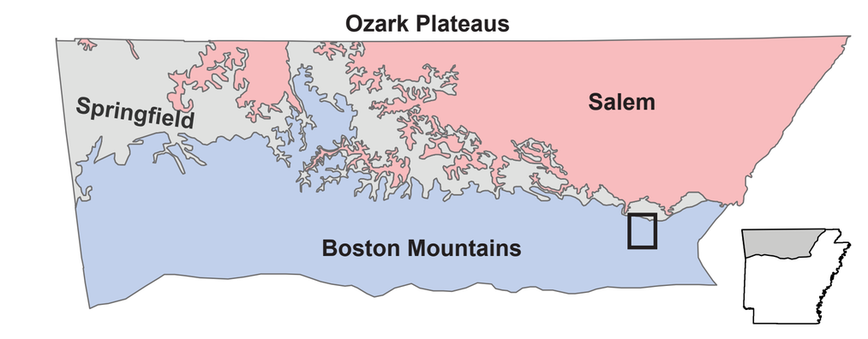
Quadrangle Location

Adjoining Quadrangles: Marcella, Bethesda, Batesville, Drasco, Jamestown, Greers Ferry Dam, Floral, Pleasant Plains

ROAD CLASSIFICATION
Secondary highway
Light duty road
Unimproved road

Correlation of Map Units

- Qat, Qty, Qls, Qtm — Holocene-Pleistocene — Quaternary
- Unconformity
- Pw — Morrowan — Pennsylvanian
- Unconformity
- Phc — Morrowan — Pennsylvanian
- Unconformity
- Mi, Mp, Mf, Mbv, Mm — Chesterian — Mississippian

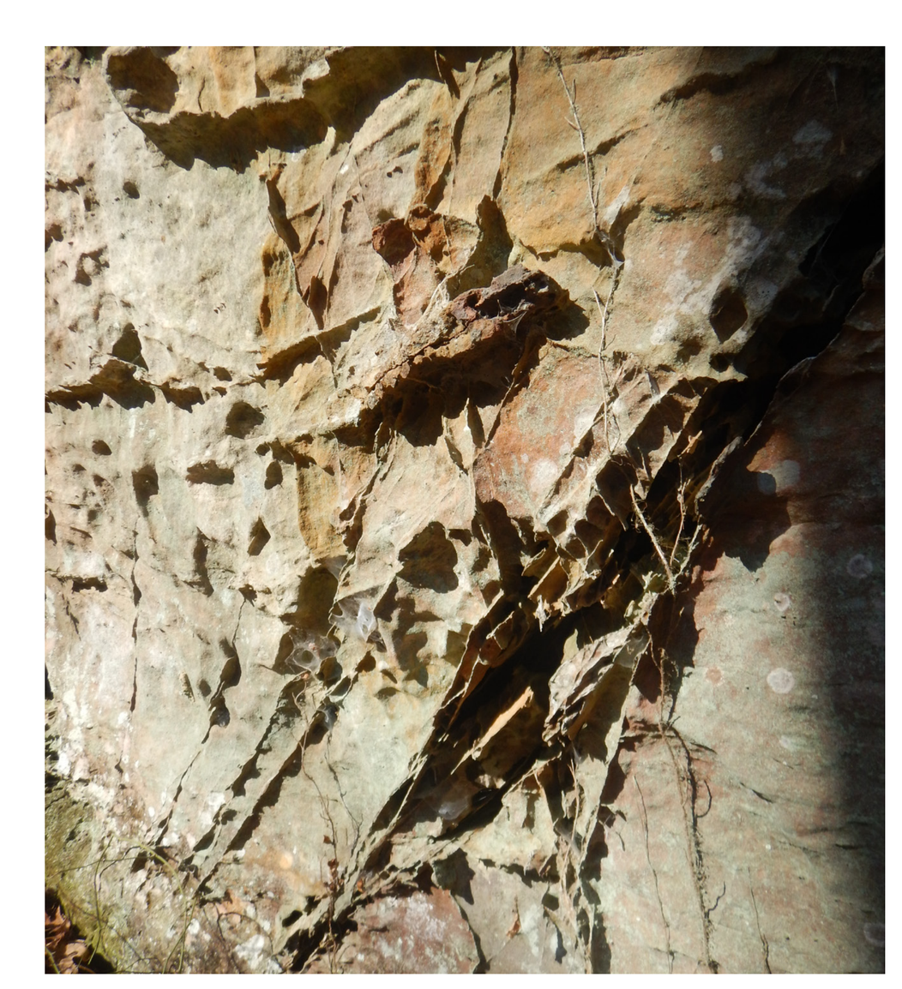


Location of the Concord quadrangle on the Boston Mountains Plateau in the Ozark Plateaus Physiographic Province

Introduction

This map depicts the bedrock and surficial geology of the Concord 7.5-minute series USGS topographic quadrangle in Cleburne, Independence, and Stone counties, Arkansas. The map area is situated in the Boston Mountains Plateau, which is both the southernmost and highest plateau surface in the Ozark Plateaus Physiographic Province. Regional dip is slightly south with local interruptions due to structures. Approximately 1,600 feet (487 meters) of late Mississippian (Chesterian) through early Pennsylvanian (Morrowan) clastic and carbonate rocks crop out in this area. North of the White River, the Batesville Sandstone and Moorefield Formation dip to the south and are covered by Quaternary alluvial deposits. South of the White River, the Fayetteville Shale, Pitkin Limestone, and Imo interval crop out on the steep slopes of the Boston Mountains escarpment. At the crest of the Boston Mountains Plateau, between 1,000 and 1,200 feet (300-365 meters) in elevation, sandstone and shale of the Cane Hill Member of the Hale Formation forms gentle slopes above steep valleys near the community of Almond. To the south, an area of rolling topography and strongly dissected valleys has formed on the shale and sandstone of the Witts Springs Formation. Depositional environments are primarily shallow marine and include shallow shelf, shoreface, deltaic, and fluvial regimes. The mapped area is situated in the White River watershed and drains into the White River via Wolf Bayou, Greenbrier Creek, or Salado Creek, while a small area in the southwest part drains to the Little Red River via Big Creek. Karst features such as springs, sinkholes, and caves are common in the carbonate units. Faults in the area are normal and generally trend east-west with slight deviation to the northeast and northwest and predominantly show down-to-the-south displacement.

The geology of the Concord quadrangle was previously mapped by E.E. Glick in 1973 in preparation for the 1:500,000-scale Geologic Map of Arkansas. M. Gordan Jr. and D.M. Kinney mapped parts of Dean and Brock mountains in 1944 during their study of the Batesville District. Several other workers have investigated various structural and stratigraphic aspects of the rocks in the area. This map builds on this previous work and depicts the stratigraphy and structure in greater detail. The structures and contacts are based primarily on field observations made from July 2024 to April 2025. Representative rock samples were collected and described. Data and site locations were recorded on a portable GPS data collector and integrated into a geodatabase.



Deformation bands adjacent to a fault in the Witts Springs Formation near Berry Branch.

Symbols

- Contact
- A — A' Line of cross-section
- Normal fault - ball and bar on downthrown side. Arrow shows dip direction and dip of fault plane. Dotted where concealed.
- Monocline
- Strike and dip
- Mine or Quarry
- Pit

Description of Map Units

Qat — **Alluvium and terrace deposits (Quaternary)** – unconsolidated clay, silt, sand, and gravel including deposits on the modern floodplain and one or more terrace levels along larger tributaries. Approximately 20-40 feet (6-12 meters) thick.

Qty — **Young terrace and active channel deposits (Quaternary)** – unconsolidated clay, silt, sand, and gravel in gravel bars and sandy point bars along the White River. Includes youngest terraces above the river which are primarily clay, silt, and sand. Uppermost surfaces are generally flat but locally hummocky and dissected by tributaries. Approximately 20-30 feet (6-9 meters) thick.

Qtm — **Medial terrace and alluvial deposits (Quaternary)** – older terraces composed of unconsolidated clay, silt, and sand in a deposit approximately 30 feet (9 meters) above the White River. Ranges from 20-30 feet (6-9 meters) thick.

Qls — **Landslide deposits (Quaternary)** – a mass of rock and debris that has moved downslope due to gravity. Only the largest landslide deposits are depicted.

Pw — **Witts Springs Formation (Lower Pennsylvanian, Morrowan)** – predominantly sandstone with minor limey sandstone, shale, and siltstone. Sandstone is fine grained but locally ranges from very fine to coarse and friable with iron case hardening. Locally conglomeratic intervals contain milky quartz pebbles and granules, shale pebbles and molds, iron concretions, and fossil fragments and molds. Sandstone is typically thin to thick bedded and 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. Liesegang banding, stylolites, and honeycomb weathering are common. Locally contains trace fossils and fossil wood prints and molds. Zones of limey sandstone are locally present and contain fossil fragments and molds, including crinoids, brachiopods, gastropods, and corals. 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. Thickness ranges from 80-300 feet (24-91 meters).

Phc — **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 Witts Springs Formation.

Cane Hill Member – consists of sandstone interbedded with shale and siltstone. Sandstone is very thin to medium bedded and commonly ripple, flaser, or cross bedded. Very fine to fine grained and locally silty and micaceous. Commonly buff to tan on fresh surfaces but weathers grayish brown to dark brown. Stylolites, liesegang banding, trace fossils, and coalified fossil wood molds are common. Locally contains shale pebbles and partings. Shale is rarely exposed but is clay to silty, gray to black on fresh surfaces, and weathers brown to tan. Siltstone is tan to brown or gray on fresh surfaces and weathers dark brown. Unconformable with the underlying Imo interval. Ranges from 40-120 feet (12-36 meters) thick.

Mi — **Imo interval (Upper Mississippian, Chesterian)** – consists primarily of sandstone with minor shale, siltstone, conglomerate, and limestone. Sandstone is very fine to medium grained and locally contains subangular to rounded milky quartz pebbles and granules. Bedding is commonly masked by iron case hardening but where visible, it is thin to thick bedded and commonly cross bedded, ripple bedded, or hummocky. Generally has a massive, rounded to blocky appearance with locally abundant liesegang banding, stylolites, and honeycomb weathering. On fresh surfaces it is buff to tan and weathers to light or medium gray. Sandstone units are typically 15-80 feet (5-24 meters) thick. The basal unit is black to dark gray, fossiliferous, concretionary, fissile clay shale with siltstone, conglomerate, and limestone lenses. Contains a wide variety of fossils including corals, bryozoans, ammonoids, nautiloids, crinoids, bivalves, and brachiopods. The sandstone units commonly have molds and casts of plants and scale trees, coalified wood fragments, and locally abundant trace fossils. Conformable with the underlying Pitkin Limestone. Thickness ranges from 300-420 feet (91-128 meters).

Mp — **Pitkin Limestone (Upper Mississippian, Chesterian)** – consists of fine- to coarse-grained, oolitic and bioclastic limestone. Thin to thick bedded and locally cross bedded or hummocky. On fresh surfaces it is gray to dark gray and weathers to light or bluish gray. Thin calcareous shale intervals are interbedded with the limestone in the lower part of the formation. A sandy limestone or siltstone is locally present at the top of the formation. Contains fossils, primarily brachiopods, corals, crinoid stems, gastropods, and bryozoans including the characteristic *Archimedes*. A shark tooth was found at one location. Karst features are common and include springs, caves, sinkholes, and solutionally enlarged joints. Petroliferous on fresh surfaces. Conformable with the underlying Fayetteville Shale. Ranges from 260-320 feet (80-98 meters) thick.

Mf — **Fayetteville Shale (Upper Mississippian, Chesterian)** – predominately fissile clay shale that is black on fresh surfaces and weathers dark gray to tan. Interbedded micrite and shale is in the upper part of the formation. The micrite is black to dark gray and weathers light gray. Septarian concretions and concretionary siltstone beds are locally present near the base of the shale. Fossils are typically sparse but locally abundant. Karst features including springs, caves, and sinkholes are common in the carbonate intervals. Commonly petroliferous on freshly broken surfaces. Conformable with the underlying Batesville Sandstone. Thickness ranges from 260-300 feet (80-90 meters).

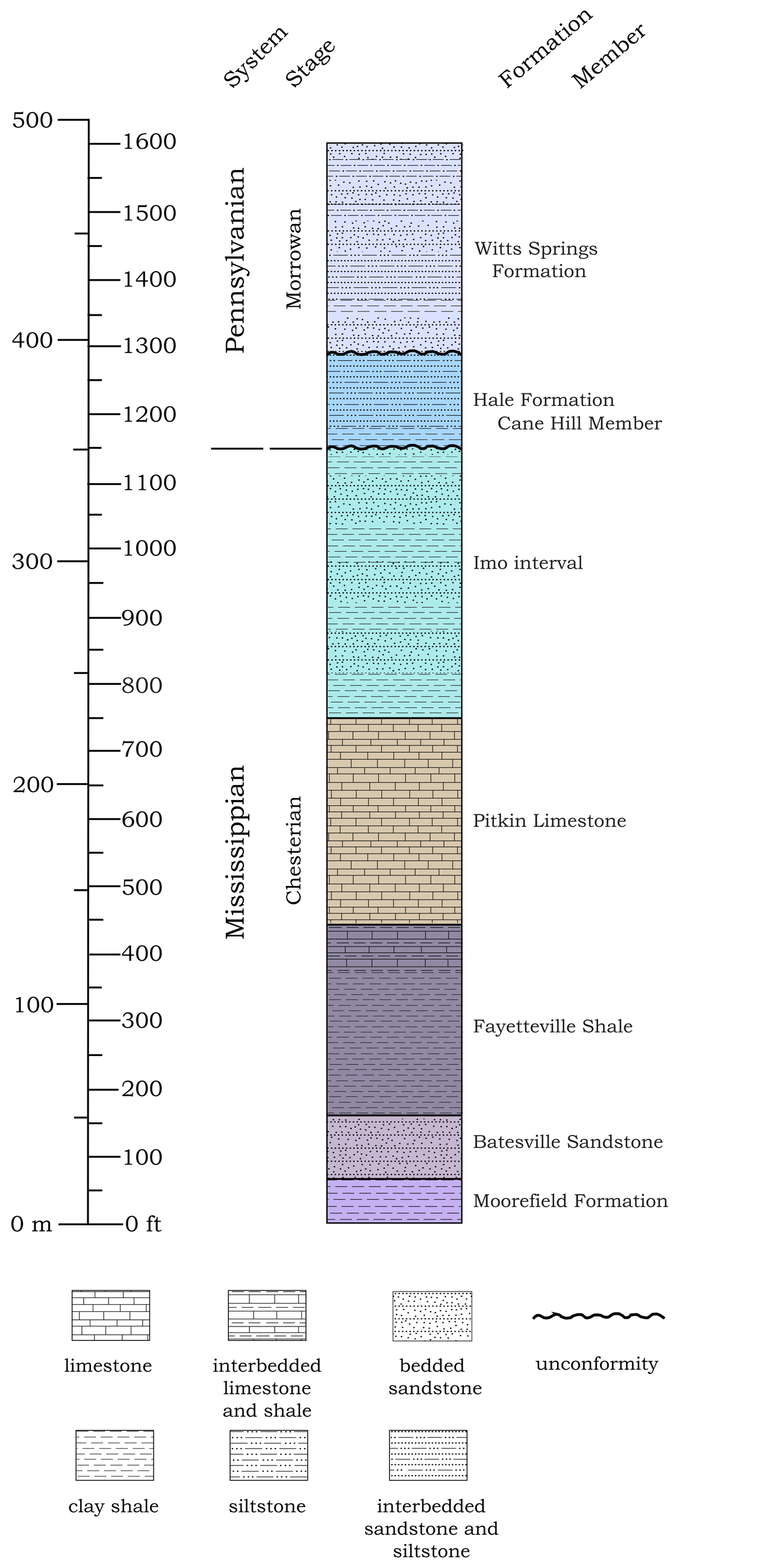
Mbv — **Batesville Sandstone (Upper Mississippian, Chesterian)** – consists of fine- to medium-grained, subangular, moderately sorted, locally micaceous, iron- to calcite-cemented sandstone. Thin to thick bedded and commonly flat bedded or cross bedded. Calcareous intervals and limestone lenses are common. On fresh surfaces it is white to buff or light brown but weathers light or dark gray and brown. Commonly contains abundant trace fossils. Fossils are rare but locally abundant. Conformable with the underlying Moorefield Shale. Thickness ranges from 10-80 feet (10-24 meters).

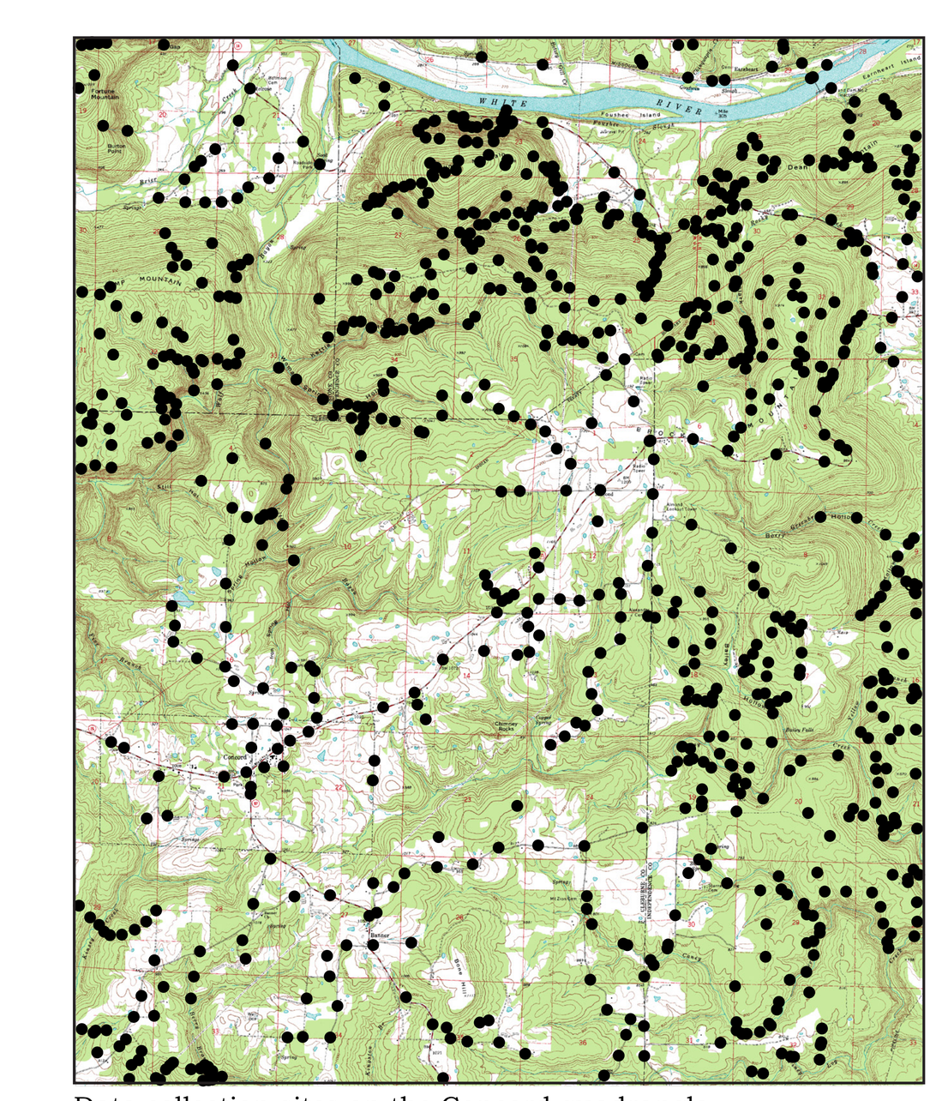
Mm — **Moorefield Shale (Upper Mississippian, Chesterian)** – consists of fissile clay shale interbedded with very thin- to thin-bedded siltstone and micritic limestone. Shale is dark gray to black on fresh surfaces and weathers gray to brown. Siltstone is dark gray to brown on fresh surfaces and weathers to light gray or buff. Sparsely fossiliferous. Commonly forms a steep slope beneath the Batesville Sandstone. Exposures are limited to the area north of the White River. Only the upper portion is present in the map area. Thickness ranges from 20-60 feet (6-18 meters).

Calcareous and fossiliferous shale and siltstone at the base of the Imo interval, Clark Hollow.

Sandstone bluff in the Imo interval, Little Bayou.

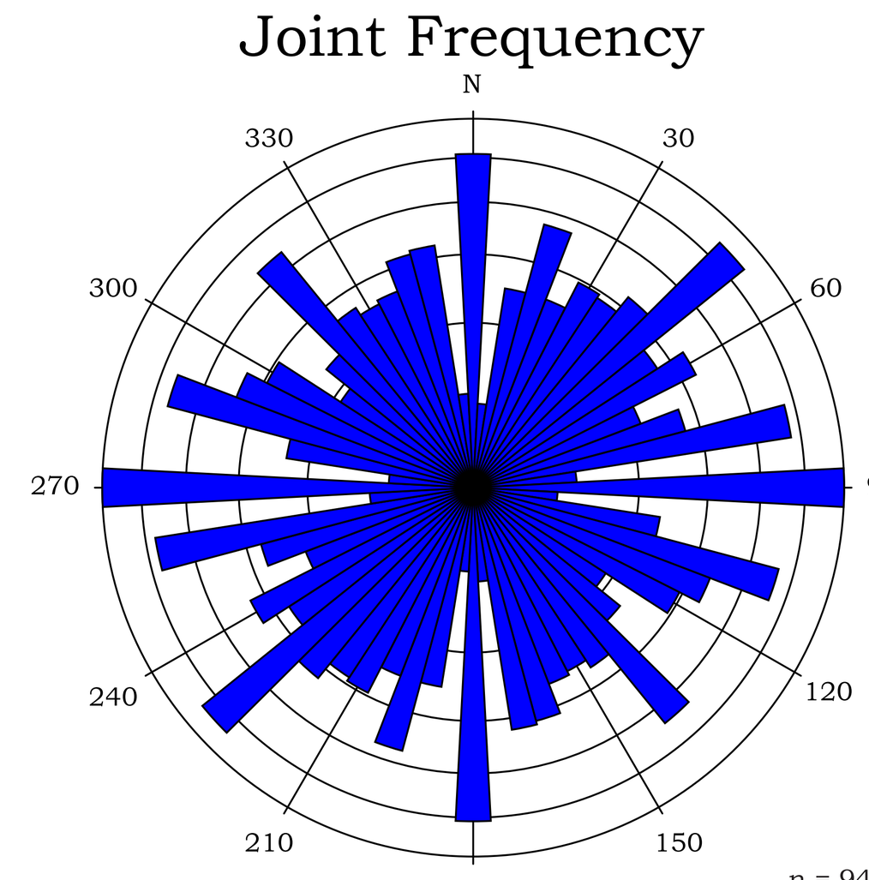
Stratigraphic Column



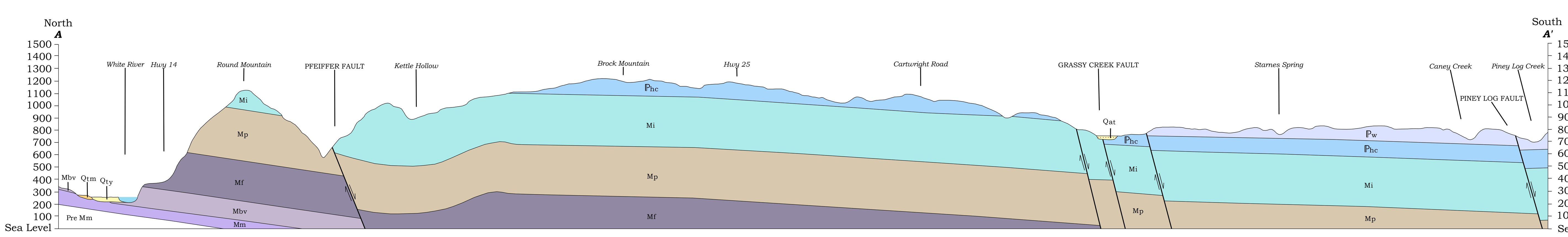


Data collection sites on the Concord quadrangle.

Joint Frequency



Rose diagram of the strike frequency of joints recorded on the Concord quadrangle.



Scale:
Horizontal: 1 Inch = 2000 Feet
Vertical: 1 Inch = 500 Feet
(Exaggeration: 4x)

References

Glick, E.E., 1973, Partial geologic map of the Concord quadrangle, Cleburne, Independence, and Stone counties, Arkansas: Arkansas Geologic Commission, Geologic Worksheet, 1 sheet, 1:24,000.

Gordon Jr., M. and Kinney, D.M., 1944, Geologic map and structure sections of the Batesville District, Independence County, Arkansas: U.S. Geological Survey, Oil and Gas Investigations Map, OM-12, 1 sheet, 1:20,000.

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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 new information is collected, the features depicted on this map may be changed.

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Map and cross section digitized by Brian Kehner.