OFFICE OF THE STATE GEOLOGIST

Geologic map of the eastern part of the north-central district, north Arkansas zinc and lead region, Marion and Baxter Counties, Arkansas

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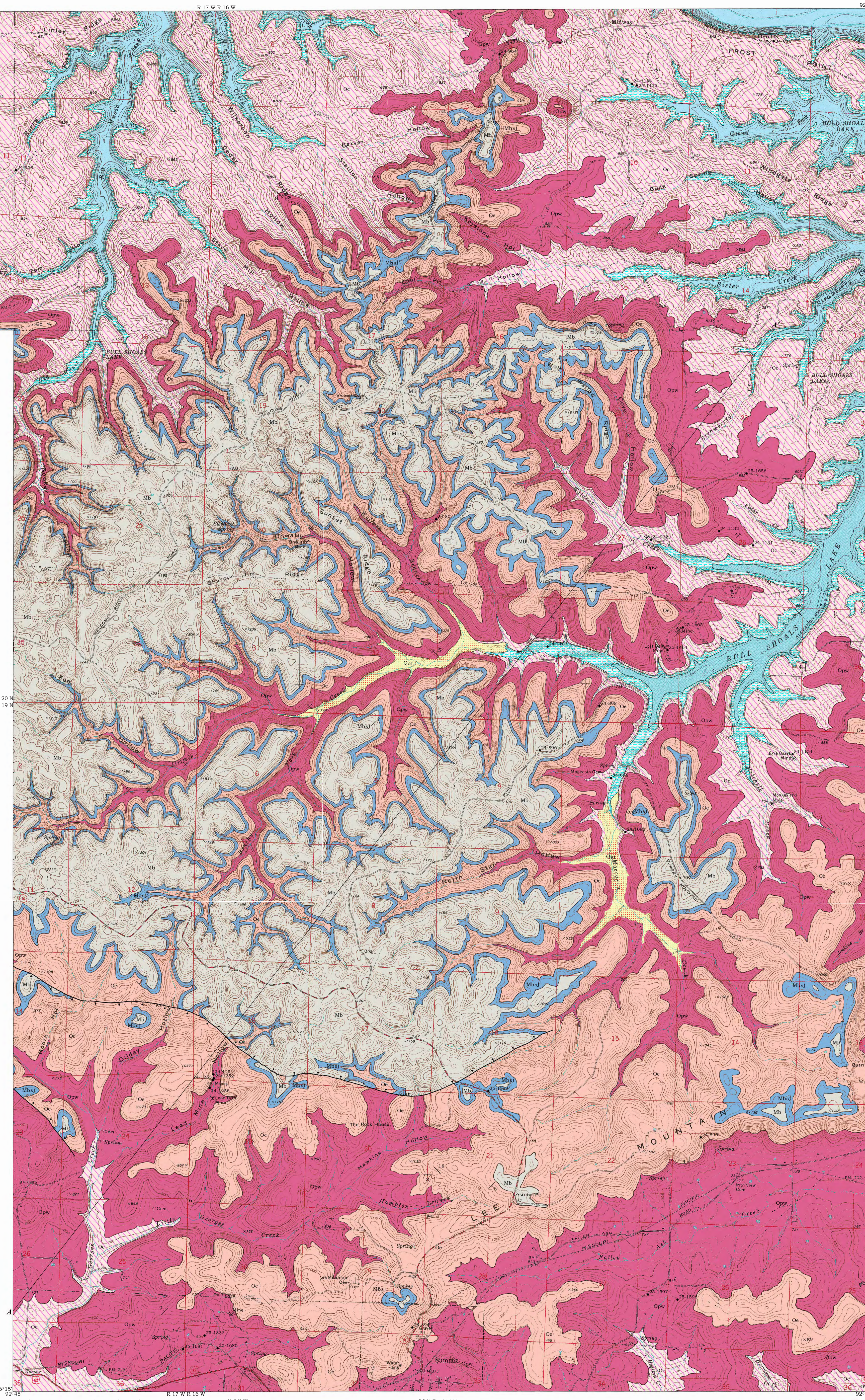
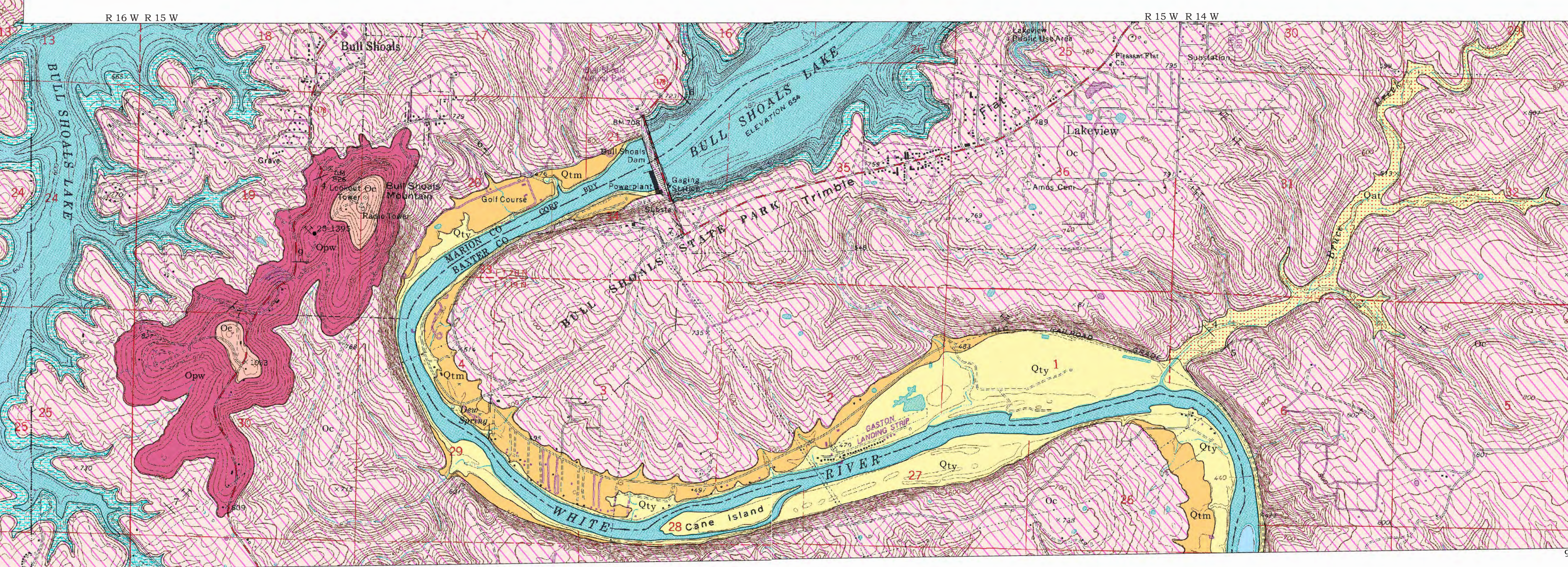
2026
Scott M. Ausbrooks, Director and State Geologist





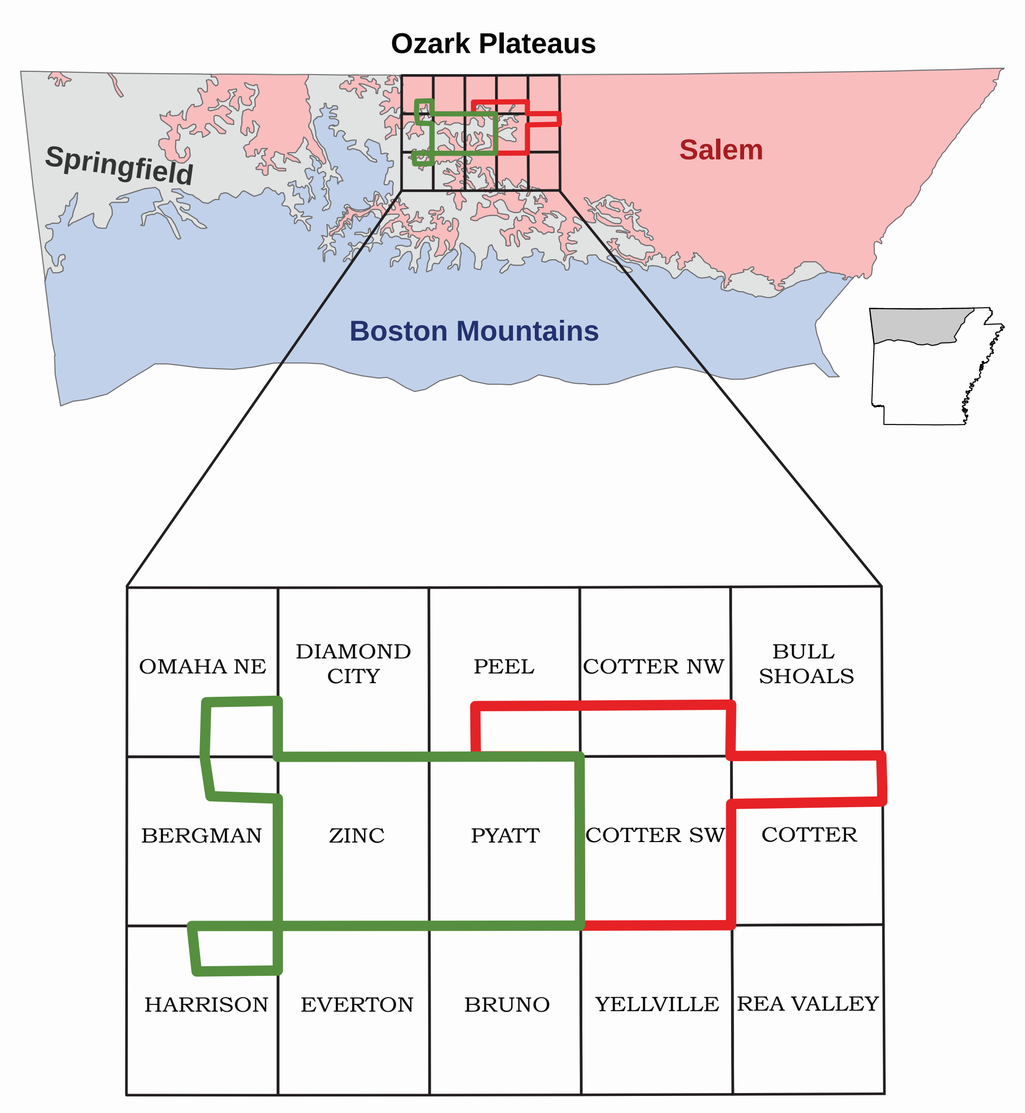
The base map is a compilation of collarless Digital Raster Graphics (DRGs). The DRGs are scanned images of the following U.S. Geological Survey 7.5-minute series topographic maps: Cotter (1972), Cotter NW (1972), Cotter SW (1972), and Peel (1972).

0° 26' W
APPROXIMATE MEAN DECLINATION, 2026

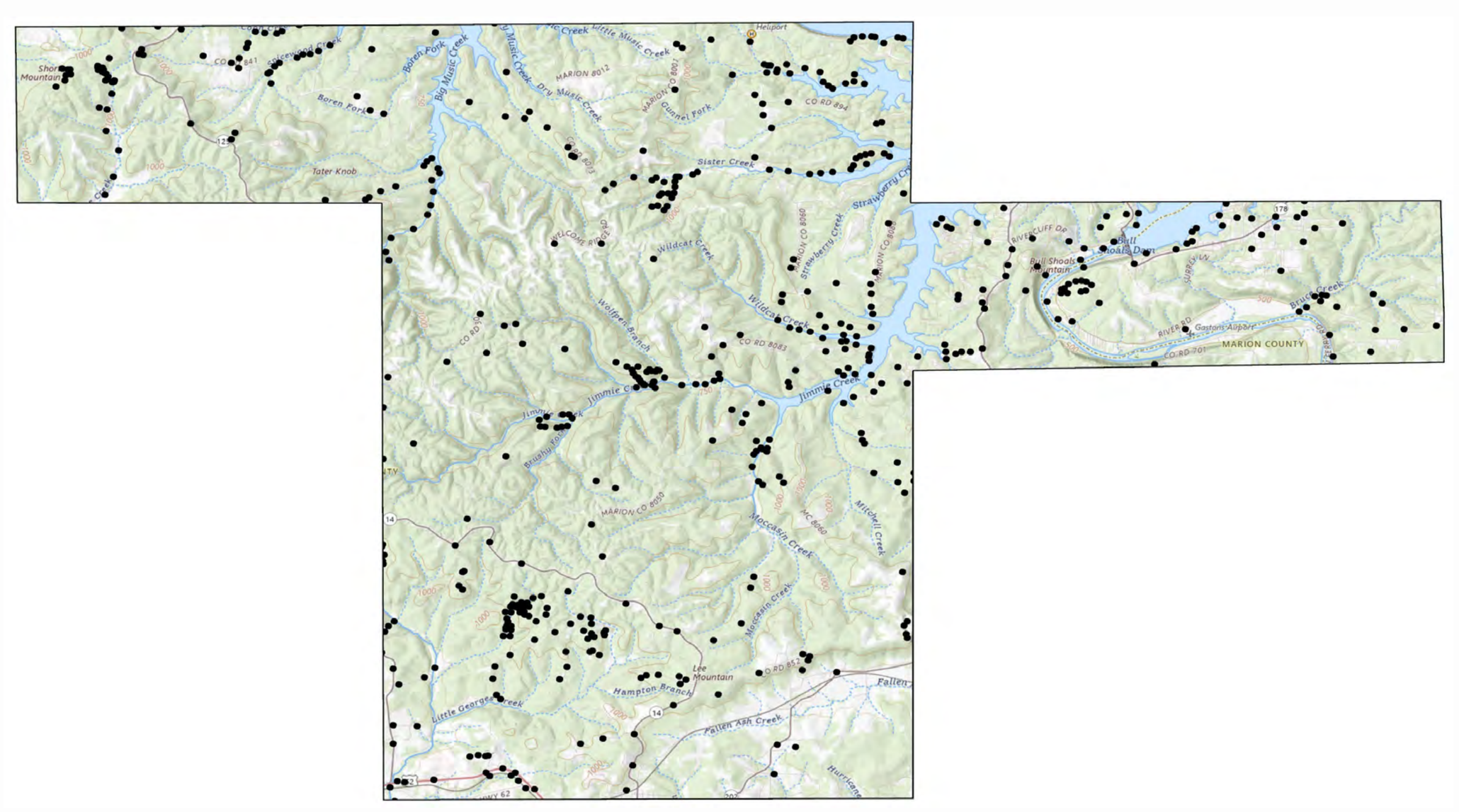
SCALE 1:24 000
Contour Interval 20 Feet
National Geodetic Vertical Datum of 1929

Map Location

Road Classification
- Primary Highway
- Secondary Highway
- Light duty road
- Unimproved road
- U.S. Route
- State Route



Location of the north-central district within the Ozark Plateaus Province. Western part highlighted in green and eastern part in red.



Shaded relief map of the area showing the location of data collection sites.

Introduction

This map is the third, in a series of three, that depicts the surface geology of the north Arkansas zinc and lead region. The region is divided into two major focus areas: the north-central district and the Northeast district. The larger north-central district is further split into two focus areas: western part and eastern part. The eastern part of the north-central district comprises portions of four 7.5-minute series topographic quadrangles including the Cotter, Cotter NW, Cotter SW, and Peel.

The eastern part of the north-central district spans the Springfield and Salem Plateaus of the Ozark Plateaus Province. Approximately 800 feet of Lower Ordovician to Upper Mississippian carbonate and clastic rocks are exposed in this area.

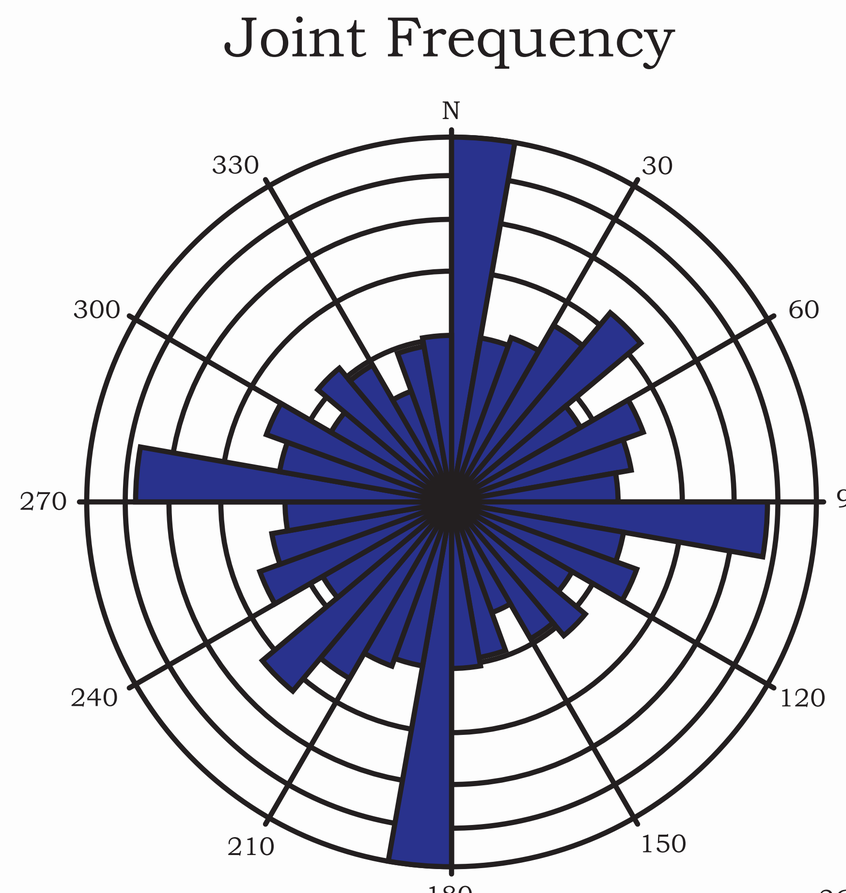
The first known occurrence of lead in this area was recorded by Schoolcraft at Bull Shoals in 1818 (McKnight, 1935). Zinc mining in this area did not begin until 1899. Total production in the north-central district is estimated to be 8,250 tons of zinc and 500 tons of lead (McKnight, 1935). Mining activity had ceased by 1930, leaving behind approximately fifty-two abandoned lead and zinc mines in the eastern part of the north-central district.

Bush and Haley (Bush and Haley, 1972 a.-d.) mapped the area in preparation for the 1:500,000-scale Geologic Map of Arkansas. Field work for the current project was conducted for the Earth Mapping Resources Initiative (EMRI) to investigate zinc as a critical mineral resource. New field data was recorded on a portable GPS data collector and uploaded to a geodatabase. Fifty-three samples were collected for petrographic analysis and thirty-two samples were submitted to the U.S. Geological Survey for geochemical analysis. Four sandstone samples were collected for detrital zircon analysis.

Symbols

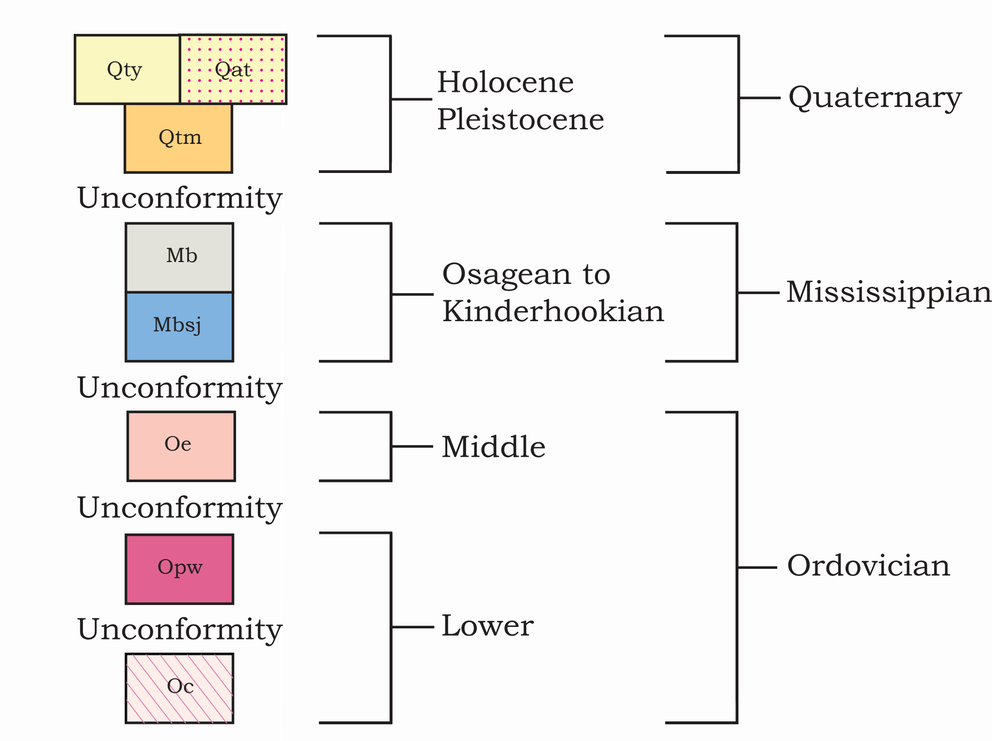
- Contact
- A — A' Line of cross-section
- Normal fault - ball and bar on downthrown side.
- Strike and dip
- Abandoned Mine or Quarry
- Sample Locality

Joint Frequency



Rose diagram of the strike frequency of joints recorded in the area.

Correlation of Map Units



Description of Map Units

Qat — **Alluvium and terrace deposits (Quaternary)** - unconsolidated clay, silt, sand, and gravel, including deposits on one or more terrace levels along larger tributaries. Ranges from 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 the youngest terraces above the river. Uppermost surfaces are generally flat but are locally hummocky and dissected by tributaries. Up to 20 feet (6 meters) thick.

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

Mb — **Boone Formation (Lower Mississippian, Osagean and Kinderhookian)** - interbedded limestone and chert. Limestone is thin- to medium-bedded, light gray, fine grained to medium-crystalline on fresh surfaces. Chert is light gray to white. This unit contains brachiopods and abundant crinoids. Springs, caves, and sinkholes are common. Conformable with the underlying St. Joe Limestone. Up to 200 feet (6-60 meters) thick.

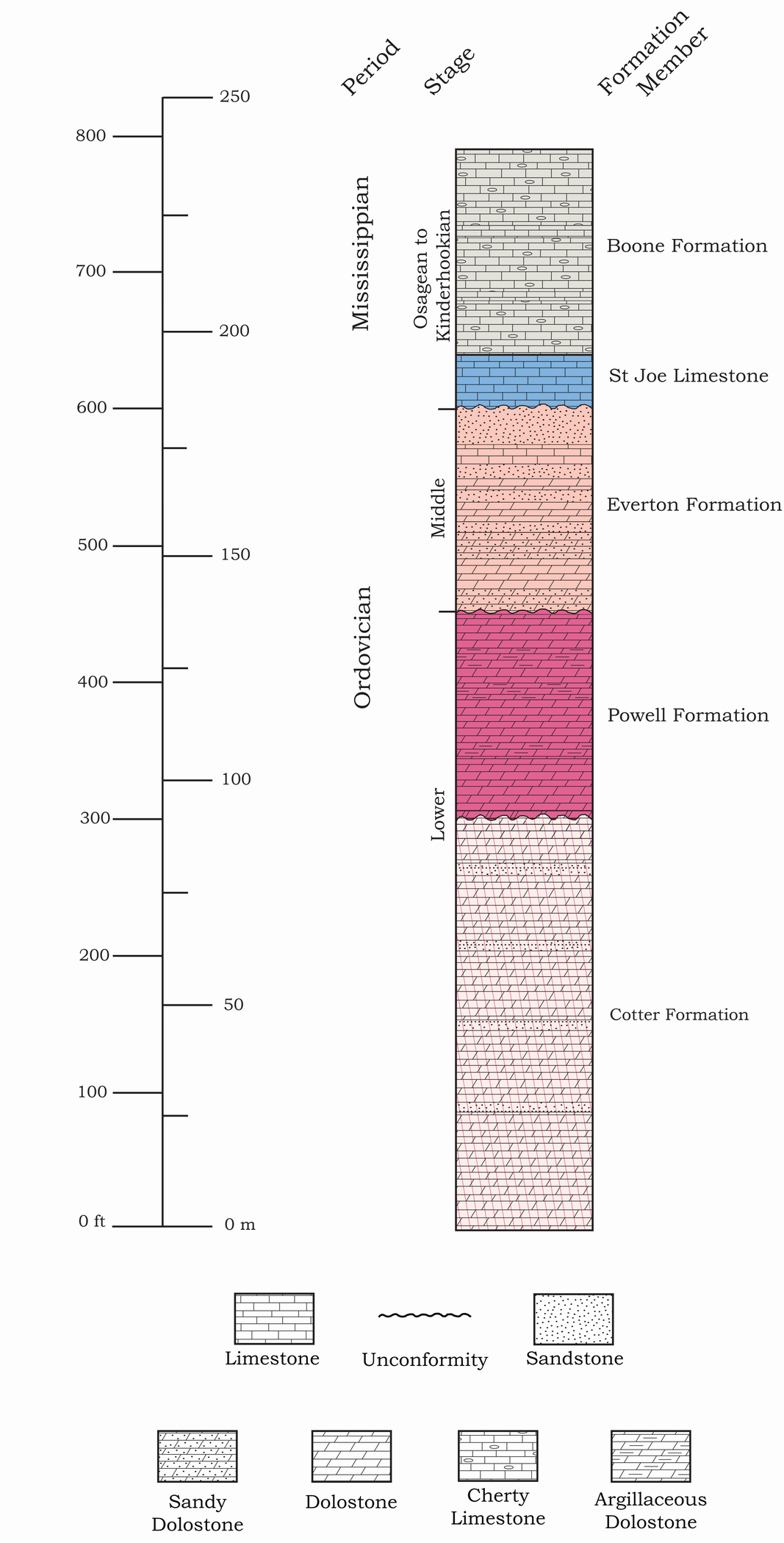
Mbsj — **St. Joe Limestone (Kinderhookian)** - medium to coarse crystalline. Thin- to medium-bedded. Light gray to red on weathered and fresh surfaces. Mostly chert free with the exception of red chert nodules in some areas. The St. Joe is a persistent bluff former and commonly features caves and springs. Unconformable with the underlying Everton Formation. Ranges from 20-40 feet (6-12 meters) thick.

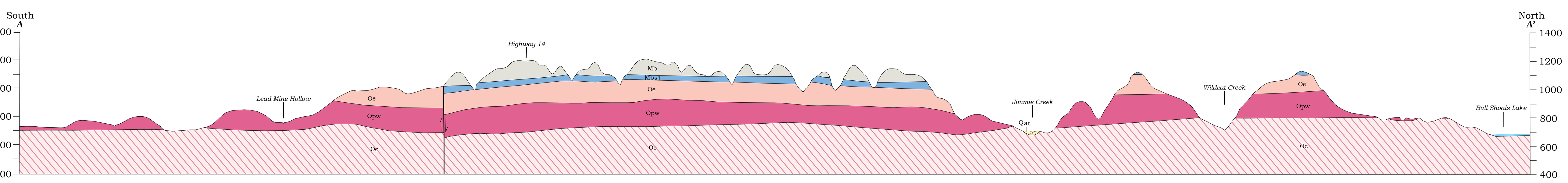
Oe — **Everton Formation (Middle Ordovician)** - interbedded dolostone, sandy dolostone, sandstone, and limestone. Dolostone is thin- to thick-bedded, light gray to buff, and fine-grained to medium-crystalline on fresh surfaces. Gray to black on weathered surfaces. Floating sand grains and sand stringers are common. Calcite and dolomite vugs are common in the dolostone. Sandstones are fine- to medium- grained, thin- to thick -bedded, buff to white, and friable but can be silica cemented. The upper portion of the Everton contains a 20-30 foot (6-9 meter) thick sandstone. This sandstone is medium to thick bedded, fine to medium grained, buff to white, and friable. A few mines were located at the contact between the St. Joe and this sandstone. Below the sandstone a 10-20 foot (3-6 meter) thick, very fine-grained, gray limestone is present. The limestone is light-gray to white on weathered surfaces and commonly stromatolitic. Drusy quartz, dolomite, sphalerite, and galena are common in mineralized areas. Pyrite mineralization along sand stringers and calcite veins was observed across the area. Eight mines in this area are in the Everton. Unconformable with the underlying Powell Formation. Ranges from 40-200 feet (12-60 meters) thick.

Opw — **Powell Formation (Lower Ordovician)** - fine-grained, light gray to greenish gray dolostone. Thin to massive bedded. Mostly sand free and commonly argillaceous. Laminated and white to light gray on fresh surfaces. Light gray to buff on weathered surfaces. Contains chert nodules that are white to light gray and locally delicately banded. Locally the top of the formation features large sandstone masses up to 30 feet (9 meters) thick infilling ancient sinkholes. Twenty-two mines in this area are in the Powell. Unconformable with the underlying Cotter Formation. Ranges from 40-200 feet (12-60 meters) thick.

Oc — **Cotter Formation (Lower Ordovician)** - Interbedded dolostone, sandstone, and chert. Dolostone is thin- to massive bedded, fine grained light gray to buff, and commonly contains mudcracks. Laminated in hand sample. Sparsley fossiliferous with the exception of a 1 foot thick bed of dolostone in which gastropods up to 1 inch (25 mm) in diameter are abundant. This bed is persistant around the lake in the northern portion of the area. Sandstone is typically thin-bedded and fine-grained, clean, white, and contains abundant ripple marks. Chert nodules are banded white to buff to gray and locally oolitic. Large stromatolites, 3-5 feet (1-2 meters) in diameter are present near the top of the formation. Twenty mines in this area are in the Cotter. Ranges from 40-320 feet (12-98 meters) thick.

Stratigraphic Column





Scale:
Horizontal: 1 Inch = 2000 Feet
Vertical: 1 Inch = 400 Feet
(Exaggeration: 5x)

References

Bush W.V., Haley B.R., 1972a., Geologic worksheet for the Cotter quadrangle: Arkansas Geological Commission, 1 sheet, 1:24,000

Bush W.V., Haley B.R., 1972b., Geologic worksheet for the Cotter NW quadrangle: Arkansas Geological Commission, 1 sheet, 1:24,000

Bush W.V., Haley B.R., 1972c., Geologic worksheet for the Cotter SW quadrangle: Arkansas Geological Commission, 1 sheet, 1:24,000

Bush W.V., Haley B.R., 1972d., Geologic worksheet for the Peel quadrangle: Arkansas Geological Commission, 1 sheet, 1:24,000

McKnight, E.T., 1935, Zinc and lead deposits of northern Arkansas: U.S. Geological Survey Bulletin 853, 311 p.

Acknowledgements: This map was produced for the Earth Mapping Resources Initiative (EMRI) grant program administered by the U.S. Geological Survey under Cooperative Agreement Award G23AC00460. Special thanks to Mr. Blackwell, Mr. Renwald, Mr. Burleson, Mrs. King, Mr. and Mrs. Blasdel, Mrs. Rodgers and Mr. Warden for access to their properties and sharing their knowledge of the area.

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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https://www.geology.arkansas.gov/maps-and-data/geologic-maps/geologic-maps.html

Suggested citation:
Liner, T.J. and Jacobs, R.E., 2026, Geologic map of the eastern part of the north-central district, north Arkansas zinc and lead region, Marion and Baxter Counties, Arkansas: Office of the State Geologist, Digital Geologic Map DGM-NARZLR-2E, 1 sheet, 1:24,000.

Map and cross section digitized by Quante Crawford.