Geologic Map of the War Eagle Quadrangle, Benton County, Arkansas

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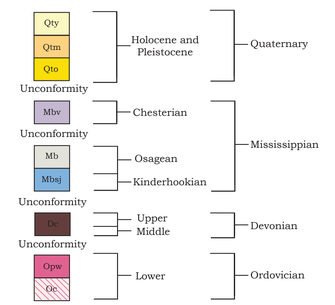
2017

Digital Geologic Quadrangle Map
War Eagle, Arkansas
DGM-AR-00886

Correlation of Map Units



Introduction

This map illustrates the surface geology of the War Eagle quadrangle. This quadrangle was previously mapped by Glick circa 1971 for the Geologic Map of Arkansas. It has also been mapped by students at the University of Arkansas: Staley, in 1962, during construction of Beaver Lake and Sullivan, in 1999, through the EDMAP Program, a part of the National Cooperative Geologic Mapping Program.

Approximately 500 feet (152 meters) of Lower Ordovician to Upper Mississippian strata crop out in this area. The Lower Ordovician Cotter Dolomite is present only on the northwestern part of the quadrangle where it is upthrown by the Fayetteville Fault. The Lower Ordovician Powell is also thicker in this area. The Cotter and Powell Dolomites form the surface of the Salem Plateau in this quadrangle. The Devonian Chattanooga Shale and Clifty Formation are thickest on the downthrown side of the fault in the east-central part of the quadrangle. In this area, the lowest sandstone bed(s) could be Ordovician in age. The Lower Mississippian cherty Boone Formation covers most of the quadrangle forming the Springfield Plateau. The St. Joe Limestone, at the base of the Boone, is a small bluff former throughout the area. The Chesterian Batesville Sandstone crops out in only two locations: on the downthrown side of the Fayetteville Fault in the southwestern portion of the quadrangle and south of the Devil's Gap Fault along the southeastern border of the quadrangle.

Quaternary terrace and alluvium deposits are present in the valley of War Eagle Creek. Two terrace levels are developed along the river: a younger and a medial. Older terraces are located 60-100 feet (18-30 meters) above the river locally.

Two normal faults are present. The Fayetteville Fault strikes southwest to northeast across the quadrangle and is downthrown on the southeast side, while the Blackburn Creek Fault (Dowell, 2004) strikes east to west across the quadrangle and is downthrown on the south side. Displacement along the Fayetteville Fault varies from 60-100 feet (18-30 meters) and offset along the Blackburn Creek Fault is approximately 60 feet (18 meters). The Devils Gap Fault to monocline is a normal fault downthrown on the north side with displacement of approximately 40 feet (12 meters).

Around 14 square miles of Hobbs State Park - Conservation Area is located in this quadrangle. One of the major themes of this park is karst landforms. The park contains a large number of caves, springs, and sinkholes. This quadrangle also contains a portion of Beaver Lake, a U.S. Army Corps of Engineers Lake, completed in 1966 for flood control of the White River Basin.

Description of Map Units

Qty **Young terrace and active channel deposits (Quaternary)** Unconsolidated clay, silt, sand and gravel in gravel bars and sandy point bar deposits along War Eagle Creek. Primarily clay, silt and sand in youngest terrace above the creek. Approximately 20-30 ft. (6-9 m) thick.

Qtm **Medial terrace and alluvial deposits (Quaternary)** Unconsolidated clay, silt, sand, gravel, and cobbles in a higher terrace along War Eagle Creek. This terrace is located approximately 30-50 ft. (9-15 m) above the creek.

Qto **Old terrace and alluvial deposits (Quaternary)** Unconsolidated gravel deposits above War Eagle Creek. Deposit consists of coarse sand to cobble sized sub-angular to rounded chert and sandstone. They are located approximately 60-100 ft. (18-30 m) above the river. Thickness unknown.

Symbols

- Contact
- A — A' Line of cross-section
- Normal fault - ball and bar on downthrown side. Dashed where inferred. Dotted where concealed.
- Monocline
- 40 Inclined bedding showing strike and dip
- Sandstone paleokarst

Mbv **Batesville Sandstone (Upper Mississippian, Chesterian)** - Consists of very fine grained thin-bedded micaceous sandstone. The sandstone is light brown to gray on fresh surfaces but weathers orange. The sandstone is conformable with the Hindsville Limestone Member. Ranges from 5-15 feet (1-5 m).

Hindsville Limestone Member - A thin-bedded, fine- to coarsely crystalline limestone. The limestone is light- to dark-gray on fresh surfaces, but generally weathers to a light-gray or brown. Usually has a strong petroliferous odor on freshly broken surfaces. The limestone is fossiliferous and/or oolitic, contains pyrite and at various localities is interbedded with thin layers of clay shale and thin beds of siltstone to fine-grained sandstone. Approximately 60-80 feet (18-24 m) thick.

Mb **Boone Formation (Lower Mississippian, Osagean and Kinderhookian)** - Coarse-grained fossiliferous and fine-grained limestones interbedded with anastomosing and bedded chert. Light to medium gray on fresh surfaces but usually weathers dark gray. The chert varies in color from white to light gray in the upper portion to dark gray or blue gray in the lower portion. Fairly chert free sections are petroliferous and contain brachiopods, corals, and crinoids. *Zoophycus* and productid brachiopods are present in the bedded chert locally. Springs, caves, and sinkholes are common. Approximately 260 feet (79 m) exposed on this quadrangle.

Mbsj **St. Joe Limestone Member (Lower Mississippian, Kinderhookian, Osagean) –** Consists of medium to coarsely crystalline and fine-grained thin-bedded limestone. These units are recognized as Formations in Missouri as follows: Bachelor, Compton, Northview and Pierson, respectively from oldest to youngest. These same units can be recognized in the St. Joe Limestone Member in Arkansas. This limestone contains numerous caves, sinkholes, and springs. Ranges from 20-40 feet (6-12 m) thick.

Pierson – Fine to coarsely crystalline, thin to thick planar bedded crinoidal limestone. Red chert is present locally. Gray to white on weathered surfaces and gray to reddish gray on fresh surfaces. Forms the upper 10-15 feet (3-5 m) of the St. Joe bluff above the Northview re-entrant.

Northview – Fine-grained argillaceous limestone. Red to gray green on fresh and weathered surfaces. Forms 2-3 feet (1m) re-entrant between the Compton and Pierson Limestones.

Compton – Fine-to medium-grained crinoidal limestone; thin bedded with wavy or nodular bedding. Gray to reddish gray on fresh surfaces but weathers light-gray to white. Contains weathered pyrite blebs. The basal two feet of this unit contains black shale clasts at one location where the Bachelor is absent. Ranges from 12-15 feet (3-5 m) thick.

Bachelor – A gray green clay shale. Contact with underlying Chattanooga Shale is sharp and unconformable. At one location a finely crystalline gray limestone is present at the contact of the green and black shale or within the Chattanooga black shale. Ranges from 0-2 foot (0-0.6 m) thick.

Dc **Chattanooga Shale (Upper Devonian)** - A clay shale that is black on fresh and weathered surfaces. It contains very small iron concretions and pyrite-marcasite concretions that vary in size from one inch to three inches (76 mm) in diameter. Ranges from 10-40 feet (3-12 m) thick.

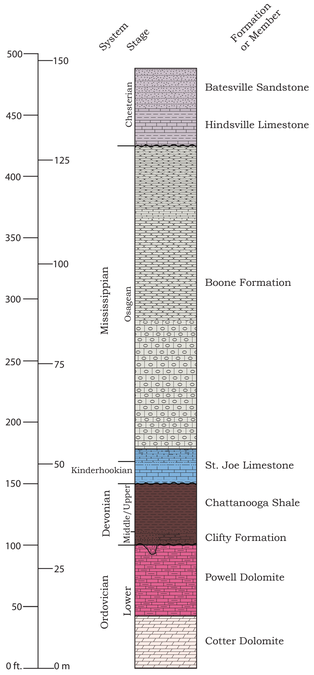
Sylamore Sandstone Member - A medium-grained, moderately sorted, sub-angular to sub-rounded, friable iron-cemented sandstone. Weathers light tan but has a salt and pepper appearance on fresh surfaces. Very thin to thin bedded. Contains angular chert fragments and trace fossils. Thickness is unknown until differentiated from underlying Clifty Formation.

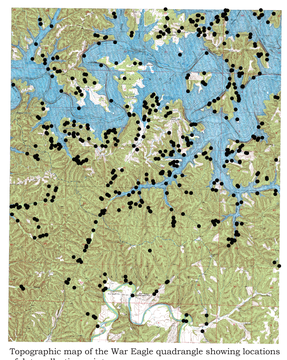
Clifty Formation (Middle Devonian) – The Clifty is mapped with the Chattanooga Shale because it is too thin to map separately, at most locations, and it is difficult to distinguish from the Sylamore Sandstone. The Clifty was originally called a limestone with the type section located on this quadrangle at the head of a large ravine on the north side of the stream, on the west side of the SW 1/4, Sec. 17, T19N, R27W (Purdue and Miser, 1916). In 1979, Wise and Caplan concluded the limestone is a lens within a sandstone with both units containing a Clifty fauna. Subsequently, the Clifty has been referred to as a sandstone. At the type section, light gray micritic limestone is present within a sandstone sequence. In this same area and within this interval, a petroliferous sandy limestone bed is also present. Elsewhere is sandstone that is fine-grained and thin-to thick- bedded, usually forming a bench or ledge. Quartz grains are rounded to sub-angular. It is white on fresh surfaces and gray to orange on weathered surfaces. Usually two sandstone beds can be distinguished within the sandstone ledge; however at a few localities several sandstone beds can be differentiated. Vertical and horizontal trace fossils are abundant. The sandstone contains chert fragments and pebble clasts/molds on the basal portion of bedding planes. Locally, a massive chert breccia is present between sandstone beds. The chert is tan to gray, contains spicules, calcite- and quartz-filled vugs, and tubes of sandstone filled with the overlying sandstone. In the southeastern portion of the quadrangle, the sandstone interval is thicker and could possibly include Ordovician sandstone. The Clifty is unconformable (locally angular) with the underlying Powell or Ordovician sandstone. Ranges from 2-15 feet (0.5-4.5 m) thick.

Opw **Powell Dolomite (Lower Ordovician) –** A very fine- to fine-grained thin- to medium-bedded argillaceous and mottled dolostone. White to light-gray on fresh and weathered surfaces. The dolostone contains calcite vugs and stromatolites. Very thin-bedded gray-green shale is interbedded with the dolostone at a few localities. Numerous sandstone masses are present within the upper portion of the Powell. These features are most likely paleokarst consisting of sand that has filled a karsted surface at the top of the Powell. The paleokarst is Devonian and possibly Ordovician in age. The basal contact of the Powell is placed at the appearance of banded chert nodules and/or chert breccia in the upper portion of the Cotter Dolomite. Approximately 60 feet (18 m) thick.

Oc **Cotter Dolomite (Lower Ordovician) –** A fine-to medium-grained dolostone, commonly bioturbated. Light gray on fresh surfaces but weathers dark gray. The dolostone contains banded chert or angular chert fragments at the upper contact with the Powell Dolomite. This unit also contains stromatolites, oolitic chert fragments and druxy quartz. At a few localities greenish clay shale is present as well as white coarse-grained sandstone in the upper portion of the dolostone. Approximately 20-60 feet (6-18 m) of section is exposed around Beaver Lake in the north-central portion of the quadrangle.

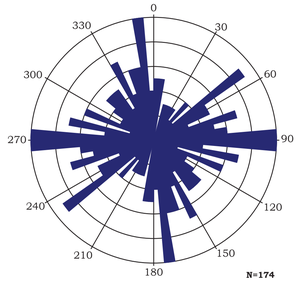
Stratigraphic Column





Topographic map of the War Eagle quadrangle showing locations of data collection points.

Joint Frequency



Rose diagram of strike frequency of joints recorded within the War Eagle quadrangle.

References

Dowell, J.C., 2004, Revised geology of the Rogers quadrangle, Benton County, Arkansas: University of Arkansas Master's Thesis, 41 p.

Glick, E.E., 1971, Geologic worksheet of the War Eagle quadrangle: Arkansas Geological Survey Geologic Worksheet, 1:24,000 scale.

Purdue, A.H., and Miser, H.D., 1916, Geologic Atlas of the United States, Eureka Springs-Harrison Folio, Arkansas - Missouri: U.S. Geological Survey, Folio No. 202, 82 p.

Staley, G., 1962, The geology of the War Eagle quadrangle, Benton County, Arkansas: University of Arkansas Master's Thesis, 56 p.

Sullivan, R.A., 1999, Revised geology of the War Eagle quadrangle, Benton County, Arkansas: University of Arkansas Master's Thesis, 70 p.

Wise, O.A., and Caplan, W.M., 1979, Silurian and Devonian rocks of northern Arkansas: Arkansas Geological Commission Information Circular 25, 14 p.

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Limitations: This map, like all geologic maps, is based on interpretations that 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 change.

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Geologic map and cross-section digitized by Brian Kehner.
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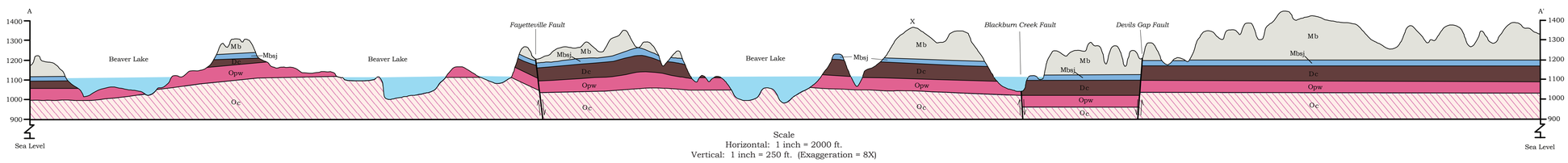

Scale
Horizontal: 1 inch = 2000 ft.
Vertical: 1 inch = 250 ft. (Exaggeration = 8X)