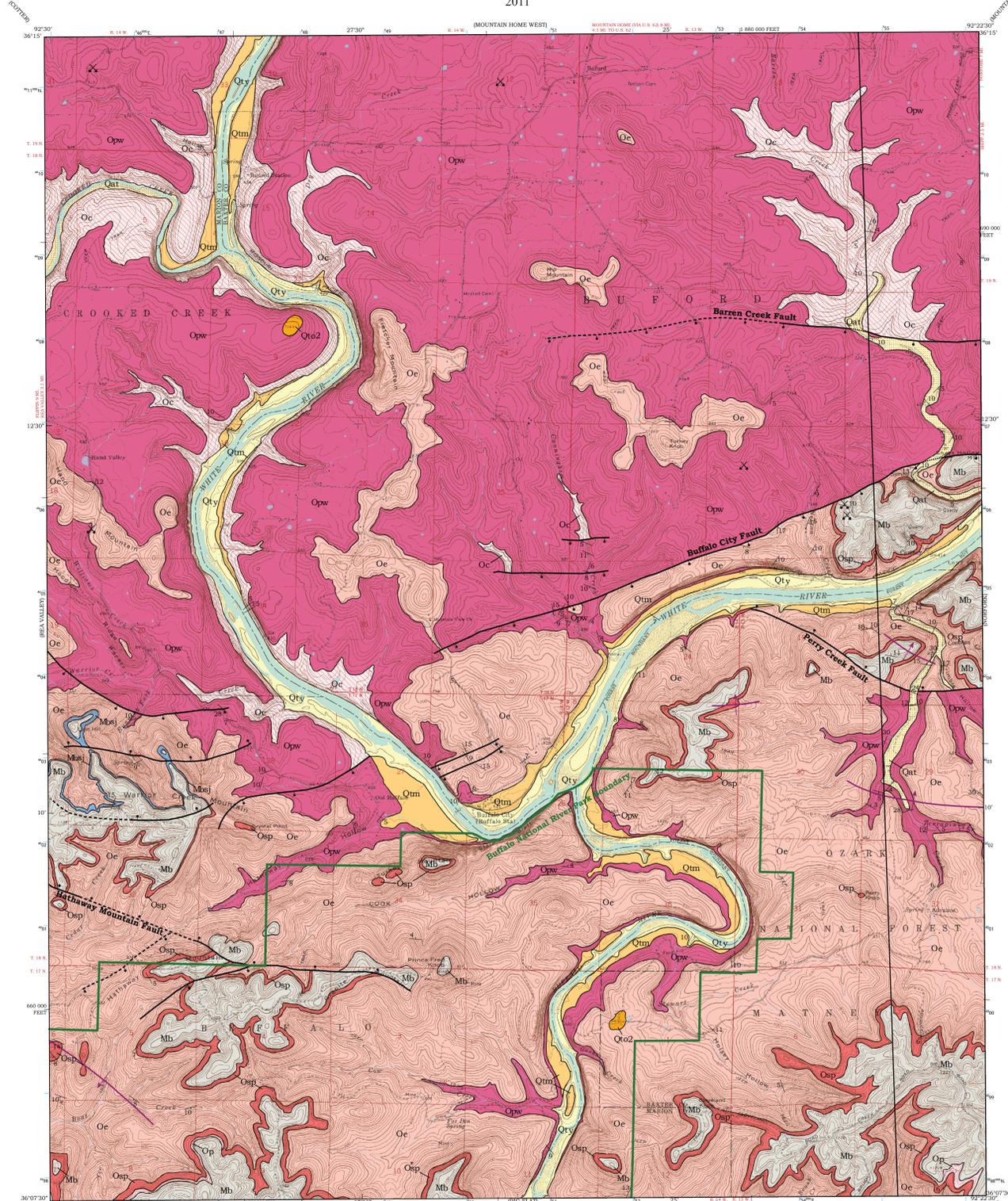


Geologic Map of the Buffalo City Quadrangle Baxter and Marion Counties, Arkansas

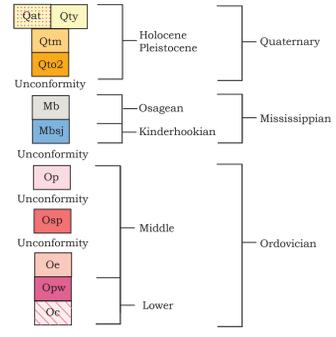
Angela K. Chandler, Lea M. Nondorf, Ty C. Johnson and Cody L. Traywick
2011



The topographic base is a colorless Digital Raster Graphic (DRG). The DRG is a scanned image of a U.S. Geological Survey standard series topographic map published in 1966.
10,000-foot grid based on Arkansas coordinate system, north zone.
100-meter Universal Transverse Mercator grid ticks, zone 15 shown in blue. 1927 North American Datum.
Approximate mean declination 2011



Correlation of Map Units



Introduction

This map illustrates the surface geology of the Buffalo City 7.5 minute quadrangle. This quadrangle was previously mapped by Ernest E. Glick in 1976 for the Geologic Map of Arkansas.
Approximately 1170 feet (356 meters) of Lower Ordovician to Lower Mississippian age strata are present in this area. The Lower-Middle Ordovician formations comprise the surface rock over the majority of the quadrangle and form the surface of the gently undulating Salem Plateau. Lower Mississippian Boone Formation forms ridges on the dissected Springfield Plateau.
Quaternary terrace and alluvium deposits are present in the valleys of the White and Buffalo Rivers and their tributaries. Two terrace levels are well displayed along the Buffalo River - a younger and medial. Very old terraces are located over 200 feet (61 meters) above the White and Buffalo Rivers.
Normal faults occur along the Barren Creek Fault and the Buffalo City, Perry Creek and Hathaway Mountain Fault Systems. The Barren Creek and Buffalo City Faults are downthrown to the south. The Barren Creek Fault has a displacement of approximately 40-50 feet (12-24 meters). The Buffalo City Fault has a displacement of approximately 300 feet (91 meters). The Perry Creek and Hathaway Mt. Faults are downthrown to the north and have displacements of 280 feet (85 meters) and 180 feet (54 meters) respectively.
Approximately 6 miles (9 kilometers) of the Buffalo National River are located on this quadrangle and are managed by the National Park Service. Almost 14 miles (22 kilometers) of the White River meanders across the quadrangle. An area of 9 square miles (23 square kilometers) of National Forest is located in the southeastern part of the quadrangle and is managed by the National Forest Service.
This area was heavily prospected for zinc in the late 1800's and early 1900's. Zinc mines and prospect pits are present throughout the quadrangle; however locations are not shown within the National Park since they are considered sensitive park resources.

Description of Map Units

- Qat:** Alluvium and terrace deposits (Quaternary) - Unconsolidated clay, silt, sand and gravel including deposits on one or more terrace levels in small creeks and tributaries to the Buffalo and White Rivers. Approximately 5-20 feet (1.5-6 meters)
- Qty:** Young terrace and active channel deposits (Quaternary) - Unconsolidated sand and gravel in gravel bars and sandy point bar deposits along the Buffalo and White Rivers. Primarily clay, silt and sand in youngest terrace above the rivers. The tops of the terraces are generally flat but can be hummocky and dissected by local side streams. Approximately 20-40 feet (6-12 meters).
- Qtm:** Medial terrace and alluvial deposits (Quaternary) - Unconsolidated clay, silt and sand in higher terrace above the Buffalo and White Rivers. Ranges in thickness from 20-30 feet (6-9 meters).
- Qto2:** Very old terrace and alluvial deposits (Quaternary) - Unconsolidated gravel deposits along the White and Buffalo Rivers. Deposit consists of coarse sand to cobble sized angular to rounded chert. One deposit is exposed approximately 280-300 feet (85-91 meters) above the White River just south of the confluence of Crooked Creek. The other deposit is exposed approximately 240 feet (73 meters) above the Buffalo River just north of Gosha Creek. These terraces probably correspond with Turner and Hudson's (2010) very old terrace. Thickness unknown.

Mb Boone Formation (Mississippian - Osagean) - Consists of interbedded thin to medium-bedded limestone and chert. Limestone is light to gray on fresh surfaces, but weathers white. The chert is various shades of gray and green. Springs, sinkholes and quartz crystal mineralization are present locally. The Boone Formation is present on the tops of the ridges but is mostly covered with a chert rubble. Unconformable upon the Plattin Limestone or St. Peter Sandstone. Approximately 60-160 feet (18-48 meters) is exposed.

Mbsj St. Joe Limestone Member (Kinderhookian-Osagean) - Consists of thin-bedded reddish to gray crinoidal limestone. Locally contains white crinoid fragments in a red fine-grained matrix and green clay "buttons". Where present, the St. Joe is commonly 5 feet thick but is only mappable on the north side of Warrior Creek Mountain. Ranges from 0 to 60 feet (0-18 meters) thick.

Op Plattin Limestone (Middle Ordovician) - A thin bedded micritic to finely crystalline limestone. Light to medium-gray on fresh surfaces, but weathers white to light-gray. The limestone is locally argillaceous and dolomitic. Contains stylolites and locally chert. Springs are abundant at the Plattin/St. Peter contact. The Plattin Limestone is present in the extreme southwestern and southeastern edges of the quadrangle. Unconformable with the underlying St. Peter Sandstone. Ranges from 0-40 feet (0-12 meters) thick.

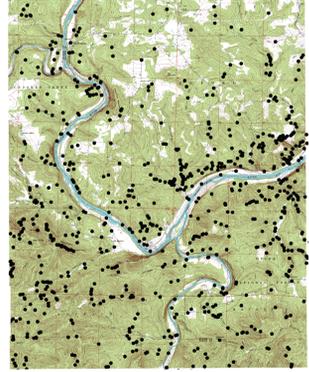
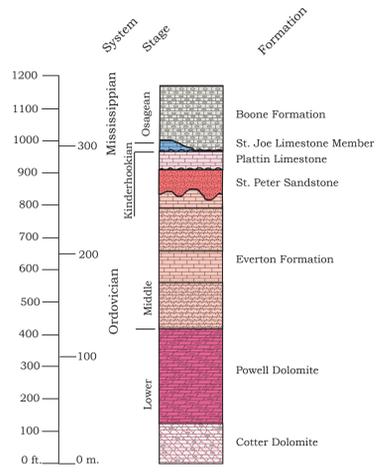
Osp St. Peter Sandstone (Middle Ordovician) - A fine-grained medium- to massive cross-bedded sandstone. Quartz grains are sub-angular to sub-rounded. White to light-gray on fresh surfaces, but weathers light-brown. Locally, sandstone is reddish or greenish in color due to iron or clay content. Commonly case hardened but friable when broken. Contains the vertical trace fossil *Skolithos* which weathers in relief to resemble icicles. This sandstone is a bluff former. Balds or glades occur locally. Cylindrical columns of sandstone referred to as "sandstone pipes" are present at various localities throughout the outcrop area. Sinkholes in the St. Peter are common. Unconformable with the underlying Everton Formation with up to 20 feet (6 meters) of relief on the undulating contact. Ranges from 0-100 feet (0-30 meters) thick.

Oe Everton Formation (Middle Ordovician) - Consists primarily of interbedded dolomite, sandy dolomite, and sandstone. Dolostones are thin- to medium-bedded and fine- to coarsely-crystalline. They are medium- gray on fresh surfaces, but weather light-gray. Sandstones are very thin- to medium- bedded and are locally silica-cemented. Quartz grains are fine to coarse and sub-rounded to well-rounded. A very thin- to thin-bedded limestone approximately 30 feet thick (9 meters) is present beneath the unconformity with the overlying St. Peter Sandstone. It is finely crystalline to micritic and commonly contains stromatolites. This limestone is referred to as the Jasper Limestone by Purdue and Miser (1916). Another section of limestone is present in the lower part of the formation. This limestone is approximately 40-80 feet thick (12-24 meters) and is very similar to the Jasper Limestone. Both limestones are light- to medium-gray on fresh surfaces but weather white to light-gray and are finely crystalline to micritic. Microfossils are common on the surface of the limestones. Oncolites, nautiloids and various fossil fragments are present in the limestones. A trilobite was discovered at one locality. Chert containing gastropods and oolites is also present locally. Contains thin bedded black chert in the lower portion of the formation. Springs are abundant. Travertine is locally abundant forming cascades and rimstone pools in streams. All of the zinc prospects are located in this unit. Conformable with the underlying Powell Dolomite. Approximately 60-640 feet (18-195 meters) thick.

Opw Powell Dolomite (Lower Ordovician) - Very fine to fine-grained thin to medium-bedded argillaceous dolomite interbedded with very thin-bedded dolomitic shale. Dolostones are white to light-gray on fresh and weathered surfaces and often laminated. The dolomite contains small quartz nodules, mudcracks and stromatolites. Shale is tan to buff on fresh and weathered surfaces. A trilobite fragment was found at one locality. Locally contains nodular chert or chert fragments and pink dolomite.
Black Ledge Chert - Approximately 40-60 feet (12-18 meters) above the base of the Powell is a chert referred to as "black ledge" (McKnight, 1935 and Cullison, 1944) because of its dark weathering appearance. The classic "black ledge" is a vuggy, comby drusy quartz that contains gastropod molds. The classic black ledge is often weathered downslope or removed for decorative stone. Most often seen is a massive white to gray chert that weathers orange. This chert forms small glades locally. 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. The upper contact with the Everton Formation is placed at the last appearance of sandy dolomite. Conformable with the underlying Cotter Dolomite. Ranges from 200-340 feet (73-103 meters) thick.

Oc Cotter Dolomite (Lower Ordovician) - Fine- to medium-crystalline dolomite. Light-gray on fresh surfaces but weathers dark-gray. Contains banded chert nodules or angular chert fragments, quartz druse vugs and laminations. Massive bedded chert is present locally. Approximately 60-180 feet (18-54) of Cotter is exposed.

Stratigraphic Column



Topographic map of the Buffalo City quadrangle showing location of data collection points.

References

- Cullison, J.S., 1944. The stratigraphy of some Lower Ordovician formations of the Ozark Uplift: University of Missouri School of Mines and Metallurgy Bulletin Technical Series no. 2, vol. XV, 112 p.
- Glick, E.E., 1976. Reconnaissance geologic map of the Buffalo City quadrangle: Arkansas Geological Survey Geologic Worksheet, 1:24,000.
- McKnight, E.T., 1935. Zinc and lead deposits of northern Arkansas: U.S. Geological Survey Bulletin 853, 311 p.
- Purdue, A.H. and Miser, H.D., 1916. Eureka Springs-Harrison Folio: U.S. Geological Survey Geological Atlas of the United States, no. 202.
- Turner, K.J. and Hudson, M.R., 2010. Geologic map of the Maumee quadrangle, Searcy and Marion Counties, Arkansas: U.S. Geological Survey Scientific Investigations Map 3134, 1:24,000.

Acknowledgments: This map was produced for the National Park Service through the Geologic Resource Inventory Program through contract C2360086145. Special thanks to the National Park Service, U.S. Forest Service, and to private landowners who graciously allowed access to their property. The Buffalo National River Park boundary came from the National Park Service, Harrison, Arkansas.

Disclaimer: This map was prepared in a digital format using ArcGIS 10, ArcMap software on computers at the Arkansas Geological Survey. The Arkansas Geological Survey does not guarantee the accuracy of this map when used on any other system or with any other software. As mapping continues and is refined, the data presented on this map may be updated. For the latest edition of this publication please contact our office.

For information on obtaining copies of this map and other Arkansas Geological Survey maps and publications call: 501-296-1877. This map is also available on our website at: www.geology.ar.gov/geologicmaps/dgm_24k.htm.

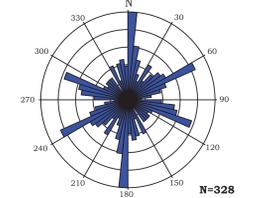
Suggested citation: Chandler, A.K., Nondorf, L.M., Johnson, T.C. and Traywick, C.L., 2011. Geologic map of the Buffalo City quadrangle, Baxter and Marion Counties, Arkansas: Arkansas Geological Survey, Digital Geologic Quadrangle Map DGM-AR-00111, 1:24,000.

Map and cross-section digitized by Cody L. Traywick.

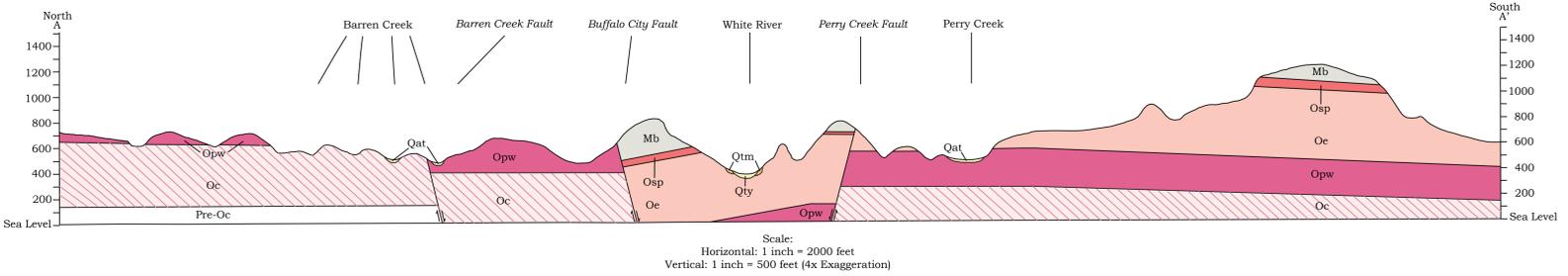
Symbols

- Contact
- Normal fault - ball and bar on downthrown side. Dashed where inferred. Dotted where concealed
- Monocline
- Zinc Prospect
- Gravel pit
- Inclined bedded showing strike and dip
- Buffalo National River Park Boundary

Joint Frequency



Rose diagram of strike frequency of joints recorded within the Buffalo City quadrangle.



Scale:
Horizontal: 1 inch = 2000 feet
Vertical: 1 inch = 500 feet (4x Exaggeration)