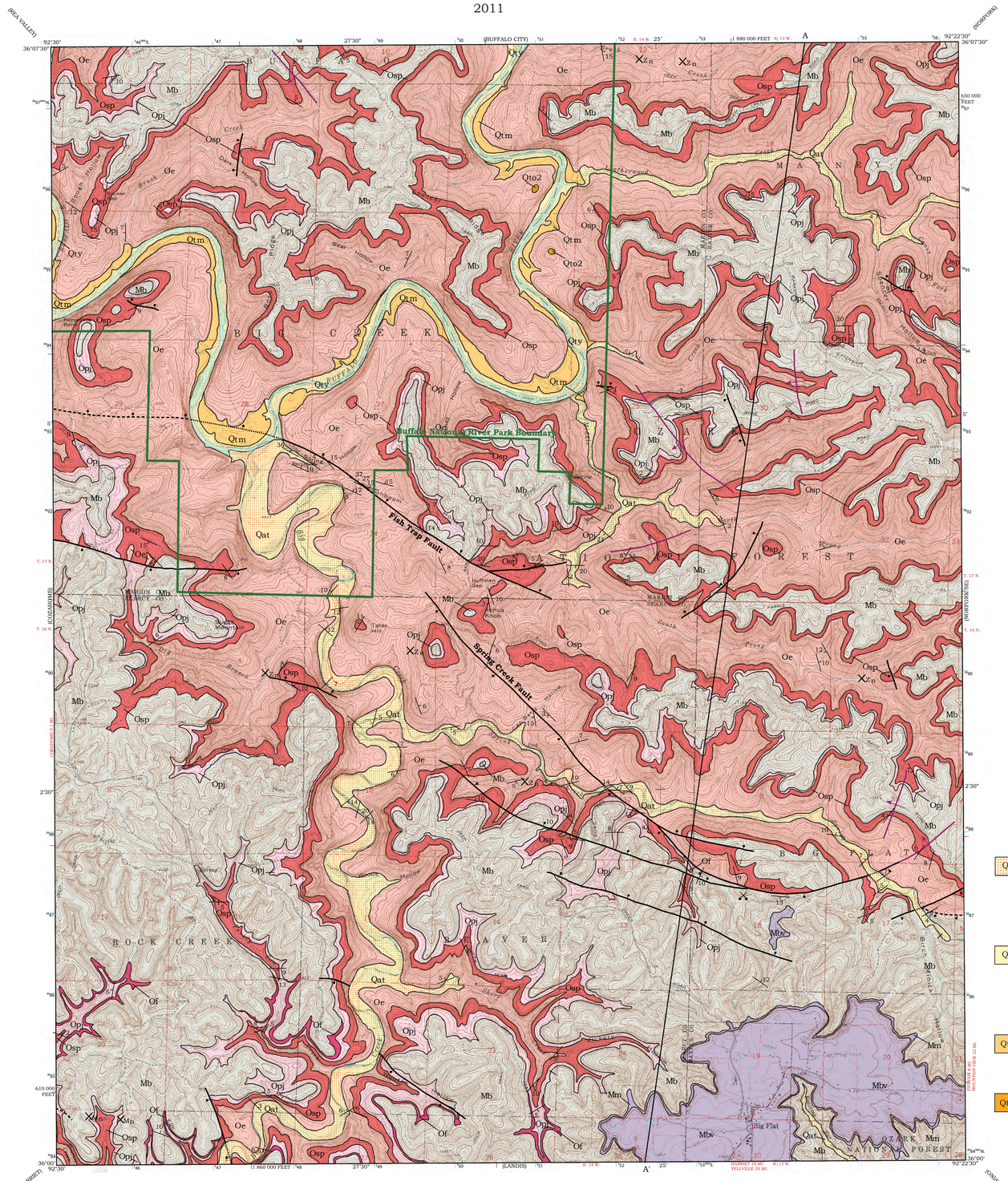
Arkansas Geological Survey
Bekki White, State Geologist and Director

Digital Geologic Quadrangle Map
Big Flat Quadrangle, Arkansas
DGM-AR-00075

Geologic Map of the Big Flat Quadrangle
Baxter, Marion and Searcy Counties Arkansas

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

2011



The topographic base is a collarless 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.

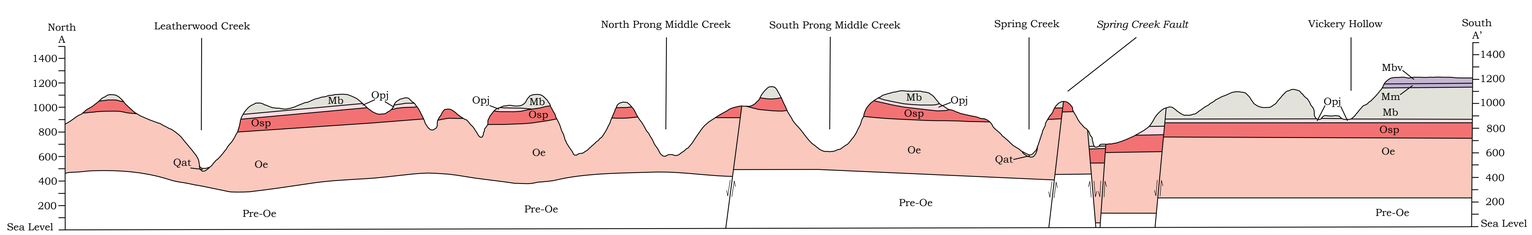
Approximate mean declination 2011

SCALE 1:24 000

Contour Interval 20 Feet
National Geodetic Vertical Datum of 1929

Quadrangle Location

Secondary highway
Light duty road
Unimproved road



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

Correlation of Map Units

Qat, Qty, Qtm, Qto2	Holocene, Pleistocene	Quaternary
Unconformity		
Mbv, Mm	Chesterian, Meramecian	Mississippian
Unconformity		
Mb	Osagean Kinderhookian	Mississippian
Unconformity		
Of	Upper	Ordovician
Unconformity		
Opj	Middle	Ordovician
Unconformity		
Osp	Middle	Ordovician
Unconformity		
Oe	Middle	Ordovician

Introduction

This map illustrates the surface geology of the Big Flat 7.5 minute quadrangle. This quadrangle was previously mapped by Ernest E. Glick in 1976 for the Geologic Map of Arkansas.

Approximately 1100 feet (335 meters) of Middle Ordovician to Lower Mississippian age strata are present in this area. Middle Ordovician strata crop out in the drainages and on steep hillsides. The Upper Ordovician Fernvale Limestone is present only in the southwestern portion of the quadrangle. The Lower Mississippian Boone Formation forms ridges on the heavily dissected Springfield Plateau surface. The Mississippian Batesville Sandstone forms a plateau surface surrounding the community of Big Flat.

Quaternary terrace and alluvium deposits are present in the valleys of the Buffalo River and its tributaries. Two terrace levels are well developed along the river: a younger and a medial. Very old terraces are located over 200 feet (61 meters) above the Buffalo River near the confluence of Leatherwood Creek.

Normal faults are present along the Spring Creek Fault system and the Fish Trap Fault system. The Spring Creek Fault is downthrown to the south with an offset of approximately 100 feet (30 meters) at the western end, 160 feet (49 meters) near Spring Creek and 60 feet (18 meters) at the eastern end where it terminates in a monocline. The Fish Trap Fault averages 200 feet (61meters) of offset and is downthrown to the north.

About 16 miles of the Buffalo National River are located in this quadrangle and are managed by the National Park Service. Approximately 25 square miles of National Forest are present in the eastern half of the quadrangle and are managed by the National Forest Service.

This area was heavily prospected in the late 1800's and early 1900's for zinc. Zinc mines and prospect pits are present throughout the quadrangle, however they are not shown in the National Park since they are considered sensitive park resources.

Descriptions 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 streams and tributaries to the Buffalo River. Approximately 5-8 feet (1-2 meters) is exposed in gravel bars along creeks and tributaries to the Buffalo River. Exposed terraces along Big Creek range from 10-30 feet (3-9 meters) thick.

Qty **Young terrace and active channel deposits (Quaternary)** -Unconsolidated clay, silt, sand and gravel in gravel bars and sandy point bar deposits along the Buffalo River. Primarily clay, silt and sand in youngest terrace above the river. The tops of terraces are generally flat but can be hummocky and dissected by tributaries. Approximately 20-30 feet (6-9 meters) thick.

Qtm **Medial terrace and alluvial deposits (Quaternary)** - Unconslidated clay, silt and sand in a higher terrace along the Buffalo River. It is approximately 40 feet (12 meters) above the river and ranges in thickness from 20-40 feet (6-12 meters).

Qto2 **Very old terrace and alluvial deposits (Quaternary)** - Unconsolidated gravel deposits on ridges above the Buffalo River. Deposit consists of coarse sand to cobble sized angular to rounded chert. Two small deposits are exposed approximately 200 feet (60 meters) above the river just south of the confluence of Leatherwood Creek. This terrace corresponds with Turner and Hudson's (2010) very old terrace. Thickness unknown.

Mbv **Batesville Sandstone (Mississippian, Chesterian)** - Consists of very fine- to fine-grained sandstone. The sand grains are angular to subangular. Contains abundant iron blebs and stringers. Thin-bedded and channel bedded. Light brown on fresh surfaces, but weathers buff to gray. Forms a plateau surface in the community of Big Flat, its only exposure on the quadrangle. Conformable with the underlying Moorefield Formation. Approximately 140-160 feet (42-49 meters) thick.

Mm **Moorefield Formation (Mississippian, Meramecian)** - Consists of clay to silty shale. Black to dark-gray on fresh surfaces, but weathers gray to light-gray. Contains trace fossils. Poorly exposed beneath the Batesville plateau surface around the community of Big Flat. Unconformable with the underlying Boone Formation. Approximately 20 feet (6 meters) thick.

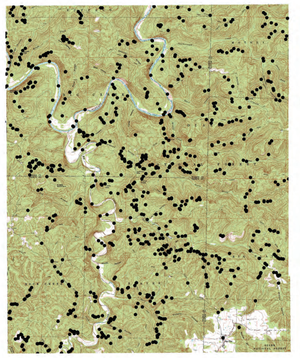
Mb **Boone Formation (Mississippian - Osagean)** - Consists of interbedded thin- to medium-bedded limestone and chert. Light- to medium-gray on fresh surfaces, but weathers white. The chert is various shades of gray and green. Springs and sinkholes are present. Quartz crystal mineralization is present locally. The Boone Formation is present on the tops of the ridges but is mostly covered with a chert rubble. Unconformable with the underlying Fernvale Limestone, Plattin Limestone or St. Peter Sandstone. Approximately 300-360 feet (91-110 meters) thick.

St. Joe Limestone Member (Osagean - Kinderhookian) - Consists of thin-bedded reddish to gray crinoidal limestone. Locally contains white crinoid fragments in a red fine-grained matrix and green clay buttons. At one locality, manganese within the limestone has been mined. A one foot bed of basal Mississippian sandstone is present at one locality. Ranges from 0-15 feet. (0-4 meters) thick.

Of **Fernvale Limestone (Upper Ordovician)** - A medium- to coarse-grained limestone. Medium-to thick- or massive- bedded. Light-pink to reddish on fresh surfaces, but weathers dark-gray. Contains barrel-shaped crinoids, brachiopod fragments, calcite vugs and pyrite. Weathers to rounded moss covered boulders. This limestone is present in the southwestern portion of the quadrangle. Unconformable with the underlying Plattin Limestone. Ranges from 0-30 feet (0-9 meters) thick.

Opj **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. Conformable when overlying the Joachim Dolomite, but unconformable when overlying the St. Peter Sandstone. Springs are abundant at the Plattin/St. Peter contact. Ranges from 0-80 feet (0- 42 meters) thick.

Joachim Dolomite (Middle Ordovician) - A finely crystalline dolostone that is medium-bedded. Contains sand in the lower portion close to the contact with the St. Peter Sandstone. Medium- to dark-gray on fresh surfaces,but weathers light-gray to white. Petroliferous and locally contains calcite veins. This unit is present sporadically throughout the quadrangle. Conformable with the underlying St. Peter Sandstone. Ranges from 0 -15 feet (0- 4 meters) thick.

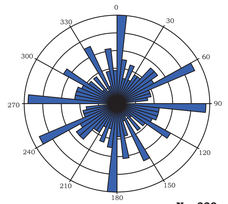


Topographic map of the Big Flat quadrangle showing location of data collection points.

Symbols

- Contact
- Normal fault - ball and bar on downthrown side. Dashed where inferred. Dotted where concealed.
- Monocline
- Prospect: Zn - Zinc; Mn - Manganese
- 40 — Inclined bedded showing strike and dip
- Buffalo National Park Boundary

Joint Frequency



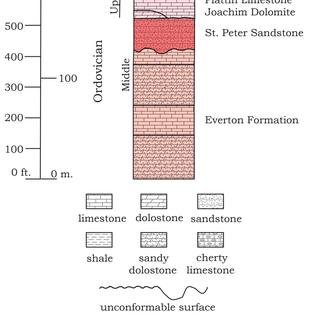
N = 330

Rose diagram of strike frequency of joints recorded within the Big Flat quadrangle.

Osp **St. Peter Sandstone (Middle Ordovician)** - A fine-grained medium-to massive-bedded, cross-bedded sandstone. Quartz grains are sub-angular to sub-rounded. White to light-gray on fresh surfaces, but weathers light- brown. Locally, sandstone will be reddish or greenish 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 throughout the quadrangle. Balds or glades occur locally. Cylindrical columns of sandstone referred to as "sandstone pipes" are present at various localities throughout the quadrangle. 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. Approximately 80-100 feet (24-30 meters) thick.

Oe **Everton Formation (Middle Ordovician)** - Consists primarily of interbedded dolostone, sandy dolostone, 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. Microkarst is common on the surface of the limestones. Oncolites, nautiloids and various fossil fragments are present in the limestones. 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 60-500 feet (18-152 meters) thick.

Stratigraphic Column



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

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Map and cross-section digitized by Cody L. Traywick