Arkansas Geological Survey
Bekki White, Director and State Geologist

Geologic Map of the Japton Quadrangle, Madison County, Arkansas

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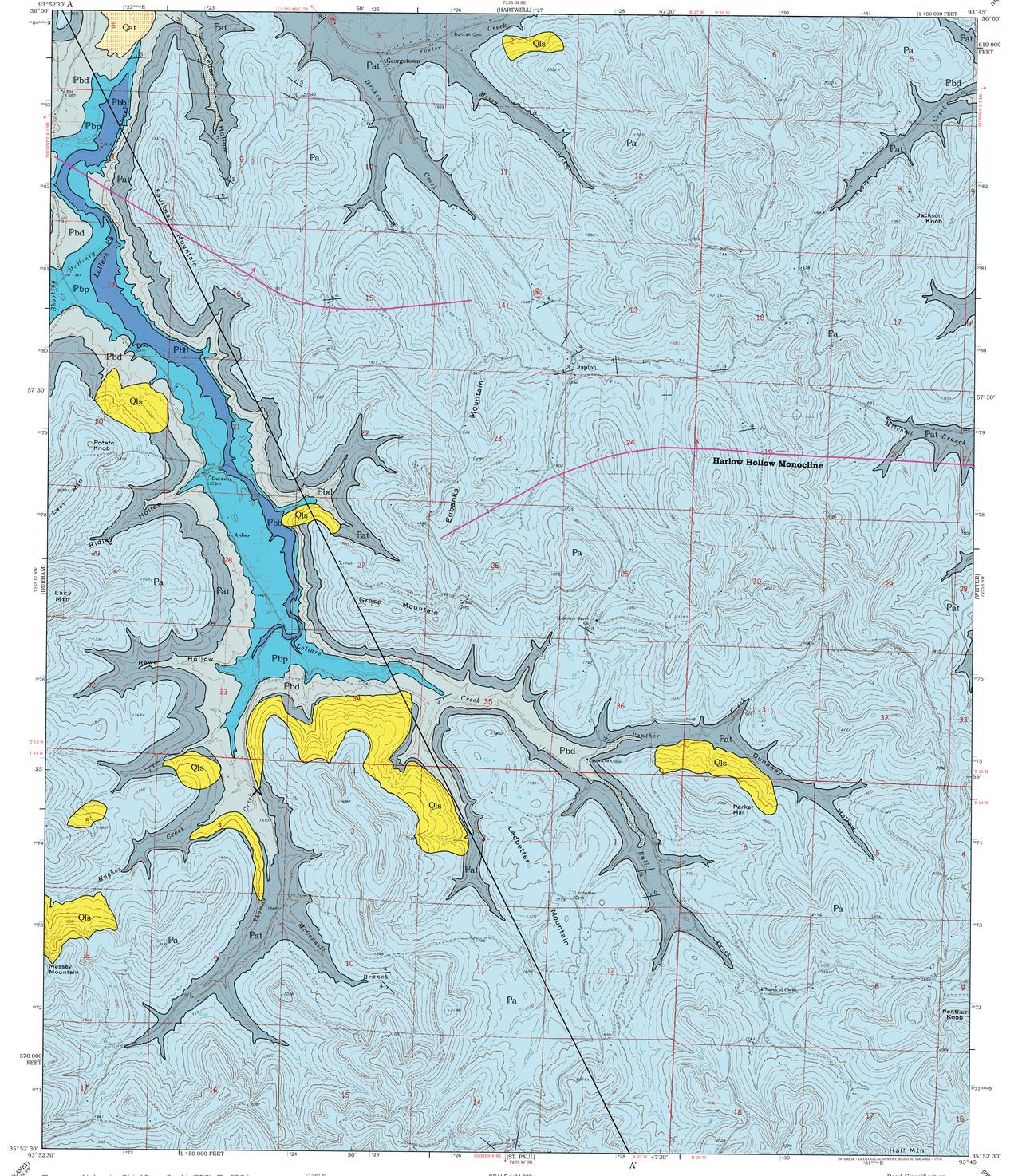
2018

Digital Geologic Quadrangle Map
Japton Quadrangle, Arkansas
DGM-AR-00437

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

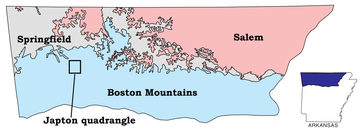
JAPTON QUADRANGLE
ARKANSAS
7.5 MINUTE SERIES (TOPOGRAPHIC)



Correlation of Map Units

Qat, Qls	Holocene & Pleistocene	Quaternary
Unconformity		
Pa, Pat	Atokan	Pennsylvanian
Unconformity		
Pbd, Pbp	Morrowan	Pennsylvanian
Unconformity		
Pbb	Morrowan	Pennsylvanian

Ozark Plateaus



Japton quadrangle location within the Boston Mountains.

Introduction

This map depicts the bedrock and surficial geology of the 7.5-minute Japton quadrangle. In this area, approximately 1000 feet (305 meters) of Pennsylvanian (Morrowan to Atokan) carbonate and clastic rocks are exposed. These rocks formed from sediment deposited in distal to near shore marine, tidal, deltaic, and fluvial environments. The quadrangle is situated on the northern part of the Boston Mountains Plateau, the southernmost and highest of three broad plateau surfaces in northern Arkansas known as the Ozark Plateaus Province. This province is part of the Interior Highlands Physiographic Region and was developed by differential erosion of sedimentary units deposited on the flanks of the Ozark Dome, a volcanic structure formed during the Precambrian, which is centered in southeast Missouri.

Two monoclines in the area bring otherwise fairly flat-lying, younger strata down toward the north and east. Major drainages include Lollars Creek and Drakes Creek, which together form Richland Creek just north of the mapped area. They are tributaries to the White River.

Previous work in this area includes part of the 15-minute geologic worksheet of the St. Paul quadrangle by B.R. Haley, circa 1972, and a Master's thesis by M.R. Shinn, circa 1979. The current mapping project is based primarily on data collected from field observations made between July, 2017 and February, 2018. These data, along with site locations, were recorded in a geodatabase on a portable data collector/global positioning satellite receiver. Representative rock samples were collected at various sites to aid in classification and for future petrographic studies.

Description of Map Units

Qat — **Alluvium and terrace deposits (Quarternary)** – unconsolidated gravel, sand, silt, and clay deposited by streams on one or more terrace levels.

Qls — **Landslide deposits (Quarternary)** - unsorted, unconsolidated rock and debris material resulting from failure of oversteepened slopes, especially those that are north facing, composed of interbedded sandstone and shale.

Pa — **Atoka Formation (Middle Pennsylvanian, Atokan)** - composed of sandstone, siltstone, and shale units, largely undifferentiated. The only Member mapped separately is the Trace Creek Shale. The Greenland Sandstone is present at the base of the undifferentiated portion. Total thickness is up to 840 feet (256 meters).

Atoka undifferentiated - shale is gray to black or tan on fresh surfaces and weathers tan or orange. Locally contains very thin- to thin-bedded, flaser-bedded, micaceous siltstone and silty sandstone. Sandstone is thin to thick bedded, very fine to fine grained. Tan, brown, or buff on fresh surfaces and weathers tan to brown. Commonly contains shale partings, liesegang banding, horizontal and vertical trace fossils, plant fossil molds, and cross-bedding. Locally contains beds of clay-pebble conglomerate with internal and external fossil molds, primarily crinoids and gastropods. Calcareous sandstone units are present locally. The portion of the Atoka higher than approximately 300 feet (91 meters) above the contact with the Bloyd Formation is much sandier and typically orange to brown and friable. Up to 720 feet (219 meters) thick.

Greenland Sandstone - thick- to medium-bedded, very fine- to coarse-grained sandstone. Commonly friable. Locally contains rounded quartz granules and pebbles, liesegang banding, and cross-bedding. Tan to brown on fresh surfaces, weathers dark brown or orange. Because this unit is so thin, it was mapped with the Atoka undifferentiated. Conformable with the underlying Trace Creek Shale. Ranges from 10 to 25 feet (3 to 8 meters) thick.

Pat — **Trace Creek Shale** - dark-gray to black shale, locally interbedded with thin- to medium-bedded claystone, siltstone, and sandstone. Sandstone is very fine to coarse grained. Unconformable with the underlying Bloyd Formation. Ranges from 80 to 120 feet (24 to 37 meters) thick.

Pbd — **Bloyd Formation (Lower Pennsylvanian, Morrowan)** - composed of sandstone, siltstone, shale, and limestone divided into several Members including, from youngest to oldest, Kessler Limestone, Dye Shale, Parthenon sandstone, and Brentwood Limestone. In the Bloyd type area at Bloyd Mountain, 20 miles (32 kilometers) west in Washington County, the Woolsey Shale is present between the Brentwood Limestone and the Dye Shale. Here, this interval is occupied by the Parthenon sandstone. Along Lollars Creek, the Parthenon and the Brentwood crop out extensively due to a slight northwesterly dip that coincides with its flow direction and gradient. Total thickness ranges from 140 to 160 feet (42 to 49 meters).

Kessler Limestone - sandy, fossiliferous, commonly oncolitic limestone. Light gray on fresh surfaces, weathers dark gray. Fossils include: crinoids, tabulate and rugose corals, brachiopods, trilobites, bryozoans, and shark teeth. Sandy intervals are commonly cross bedded. Locally contains coal fragments, phosphatic pebbles and conglomeratic beds. Because this unit is so thin, it was mapped with the Dye Shale. ***However, areas where the Kessler crops out extensively in stream beds are marked with a black, stippled pattern.*** Ranges from 5 to 15 feet (1.5 to 5 meters) thick.

Dye Shale - gray to black shale. Locally contains ironstone concretions and interbedded, thin- to medium-bedded sandstone and siltstone. Ranges from 80 to 120 feet (24 to 37 meters) thick.

Parthenon sandstone - thin- to massive-bedded, very fine- to coarse-grained, micaceous sandstone. Tan on fresh surfaces, weathers tan to brown. Commonly exhibits tabular cross-bedding. Commonly contains white quartz granules and pebbles. Unconformable with the underlying Brentwood Limestone. Ranges from 20 to 30 feet (6 to 9 meters) thick.

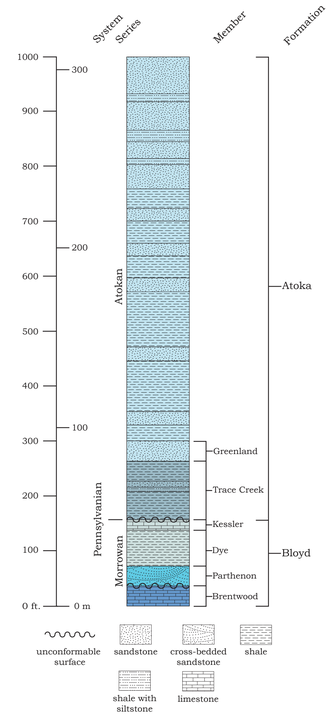
Brentwood Limestone - fossiliferous limestone, locally interbedded with sandy limestone and dark-gray to black shale and light-gray siltstone. Limestone is light gray on fresh surfaces; weathers light gray to white. Locally exhibits cross-bedding. Contains phosphatic pebbles and abundant invertebrate fossils, including crinoids, tabulate and rugose corals, brachiopods, bryozoans, and blastoids. Up to 30 feet (9 meters) thick.

Symbols

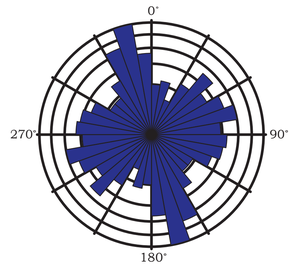
- Contact
- Strike and dip of units (7)
- Shale Pit
- A — A' Line of cross-section
- Monocline

Road Classification
- Light duty road
- Unimproved road
- State Route

Stratigraphic Column

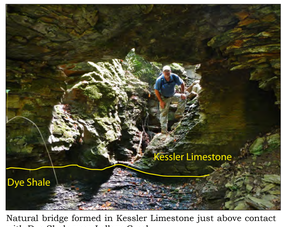


Joint Frequency

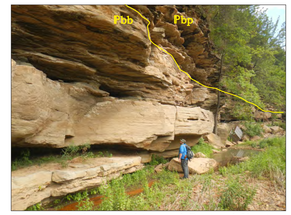


n = 407

Rose diagram of strike frequency of joints recorded within the Japton quadrangle.



Natural bridge formed in Kessler Limestone just above contact with Dye Shale near Lollars Creek.

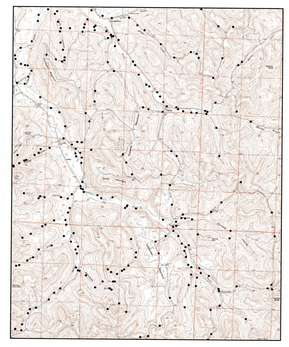


Outcrop of Parthenon sandstone and Brentwood Limestone exposed along Lollars Creek near Asher, Arkansas.

Boulder of oncolitic Kessler Limestone conglomerate in Thomas Creek. Oncoids are nucleated on invertebrate fossil remains and various detrital clasts. Clasts range in size from granules to cobbles and include phosphatic nodules, limestone, and siltstone.

Outcrop of silty sandstone typical of the lower Atoka Formation.

Cross-bedded sandstone bed of the Atoka Formation near the top of Lacy Mountain.



Topographic map of the Japton quadrangle showing locations of data collection points.

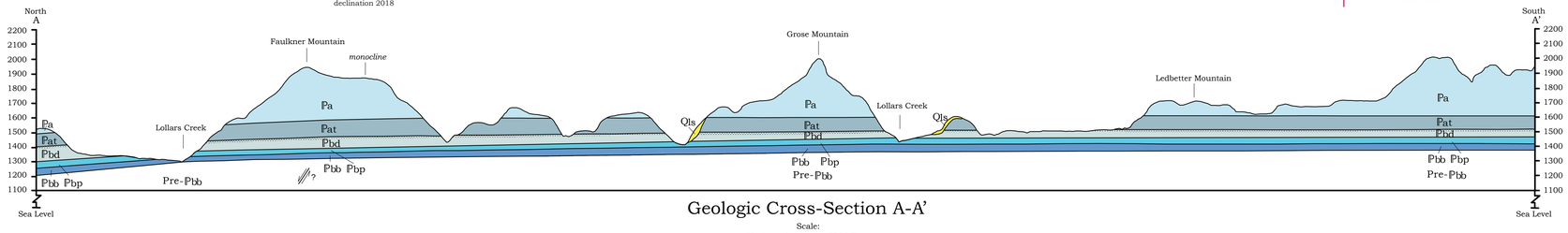
The topographic base is a Digital Raster Graphic (DRG). The DRG is a scanned image of a U.S. Geological Survey standard series topographic map published in 1973.

Projection and 10,000-foot grid ticks: Arkansas coordinate system, north zone (Lambert conformal conic).
1000-metre Universal Transverse Mercator grid ticks, zone 15, shown in blue. 1927 North American datum.

1° 20' E
TRUE NORTH
MAGNETIC NORTH
Approximate mean declination 2018

SCALE 1:24 000
1 MILE
1 KILOMETER
Contour Interval 40 Feet
National Geodetic Vertical Datum of 1929

ARKANSAS
QUADRANGLE LOCATION



Geologic Cross-Section A-A'

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

References

Haley, B. R., 1972, Geologic map of the St. Paul quadrangle, Arkansas: Arkansas Geological Survey, 15-minute series Geologic Worksheet, scale 1:62,500.

Shinn, M. R., 1979, Stuctural geology of the Brentwood-St. Paul area, northwest Arkansas [Master's Thesis, unpublished] University of Arkansas, Fayetteville, 99 p.

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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 work continues and new information is collected, the contacts, structures, and other features depicted on this map may be changed.

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Map and cross-section digitized by Brian Kehner.