GEOLOGIC MAP OF THE FORT DOUGLAS QUADRANGLE, NEWTON, POPE AND JOHNSON COUNTIES, ARKANSAS

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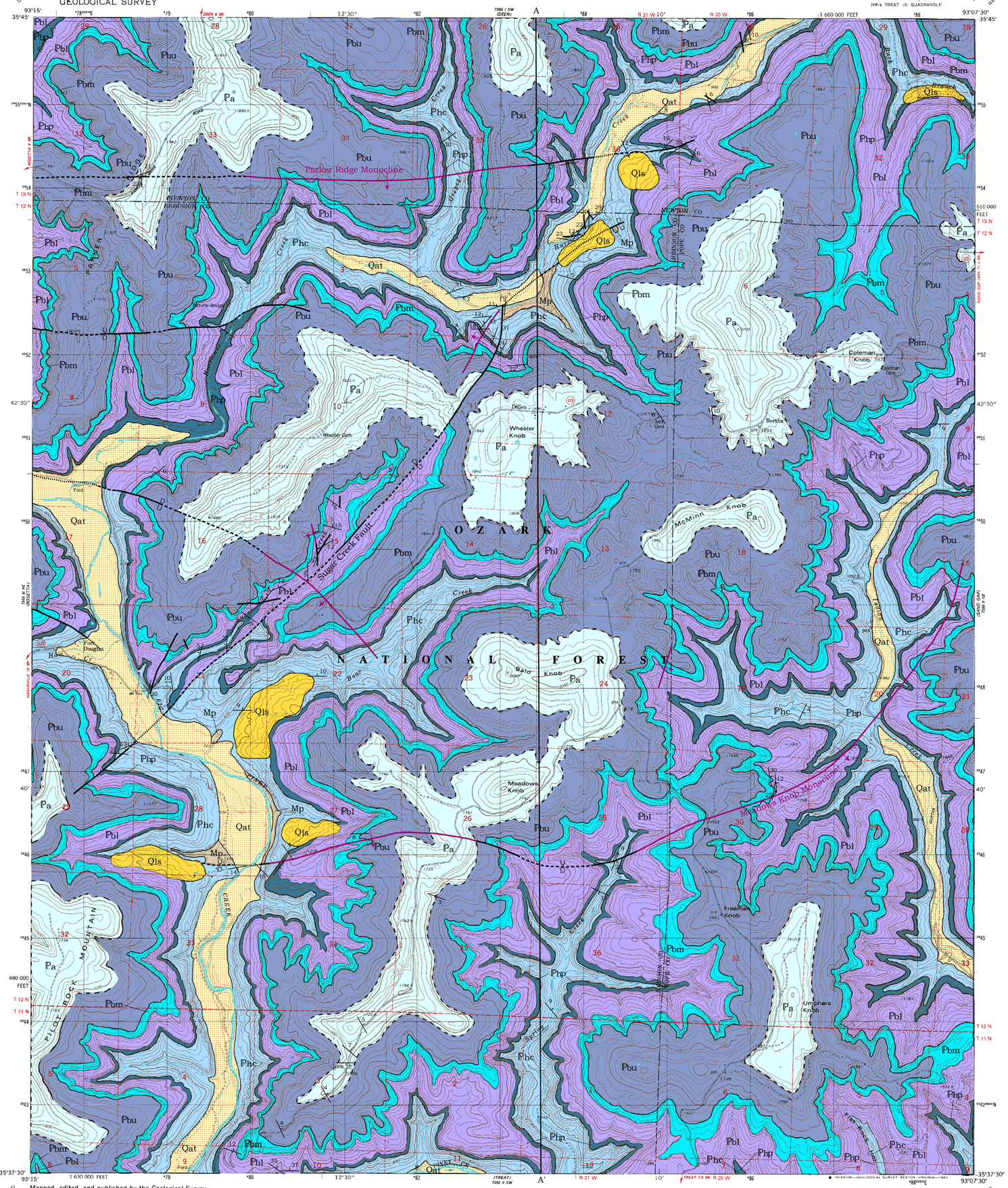
Digital compilation by Jerry W. Clark
2005
Arkansas Geological Commission, Bekki White, State Geologist

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

FORT DOUGLAS QUADRANGLE
ARKANSAS
7.5 MINUTE SERIES (TOPOGRAPHIC)



Mapped, edited, and published by the Geological Survey

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Topography by photogrammetric methods from aerial photographs taken 1975. Field checked 1976. Map edited 1980

Projection and 10,000-foot grid ticks: Arkansas coordinate system, north zone (Lambert conformal conic)
1000-meter Universal Transverse Mercator grid, zone 15
1927 North American Datum
To place on the predicted North American Datum 1983 move the projection lines 6 meters south and 16 meters east as shown by dashed corner ticks

There may be private inholdings within the boundaries of the National or State reservations shown on this map

Fine red dashed lines indicate selected fence and field lines where generally visible on aerial photographs. This information is unchecked

UTM GRID AND 1980 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

SCALE 1:24 000

CONTOUR INTERVAL 40 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
AND ARKANSAS GEOLOGICAL COMMISSION, LITTLE ROCK, ARKANSAS 72204
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

ROAD CLASSIFICATION
Primary highway, hard surface — Light-duty road, hard or improved surface
Secondary highway, hard surface — Unimproved road
Interstate Route — U. S. Route — State Route

ARKANSAS
QUADRANGLE LOCATION

FORT DOUGLAS, ARK.
NW/4 TREAT 15' QUADRANGLE
N3537.5—W9307.5/7.5
1980
DMA 7355 II NW—SERIES V884

Correlation of Map Units

Qat, Qls	Holocene and Pleistocene		Quaternary
Unconformity			
Pa	Atokan		
Pbu			
Pbm			
Unconformity			
Pbl	Morrowan		Pennsylvanian
Php			
Unconformity			
Phc			
Unconformity			
Mp	Chesterian		Mississippian

Description of Map Units

Qls — **Landslide deposits (Quaternary)** - Mostly blocks of sandstone derived from Morrowan units. Some shale slopes in the Cane Hill Member and in the Lower part of the Bloyd Formation are particularly susceptible to failure.

Qat — **Alluvium and terrace deposits (Quaternary)** - Unconsolidated clay, silt, sand and gravel including deposits on one or more terrace levels of local streams.

Pa — **Atoka Formation (Middle Pennsylvanian, Atokan)** - Consists of black to tan shales, interbedded with very thin to thin ripple-bedded micaceous siltstones, and thin to medium bedded, fine to very fine-grained sandstones with sub-angular to sub-rounded quartz grains. The sandstones are tan to buff colored on fresh and weathered surfaces and contain clay pebbles, liesegang bands, horizontal trace fossils, and cross-beds. Occasionally the sandstones contain pebble conglomerate zones with external molds of fossils. The sandstones vary from 10 - 20 ft. (3 - 6 m) thick. This contact is tentative and will be resolved with future mapping. Approximately 40 - 300 ft. (12 - 91 m) thick.

Bloyd Formation (Lower Pennsylvanian, Morrowan) - In this quadrangle the individual members within the Bloyd Formation cannot be recognized because its limestone units (Brentwood and Kessler Limestones) are either missing or have become shaly and sandy. There are no other "marker zones" to divide the section into the recognizable members known from the type section in northwest Arkansas. Therefore the Bloyd Formation is divided informally into lower and upper parts (Hudson et al., 2001) separated by the "middle Bloyd sandstone" (Zachry and Haley, 1975). Approximately 480-760 ft. (144-233 m) thick.

Pbu — **Upper part** - Consists of thin ripple-bedded to thick micaceous sandstones interbedded with clay to silty shales. The sandstones consist of fine to coarse-grained sub-angular to sub-rounded quartz. They are light- brown to gray on fresh surface but weather dark-gray. The shales are dark-gray to black on fresh and weathered surfaces. This interval contains many trace fossils and load features. Approximately 200 - 320 ft. (60 - 98 m) thick.

Pbm — **"middle Bloyd sandstone"** - A thin to massive, medium to coarse-grained, cross-bedded quartz or iron-cemented sandstone with sub-angular to sub-rounded quartz grains. Reddish, gray, or light-tan on fresh surfaces but weathers brown to orange-brown due to iron content. The cross-bedded packages can be up to three feet thick and occasionally "overturned". Contains abundant lycopod fossils and rounded quartz pebbles. This sandstone forms a prominent bluff throughout this quadrangle and separates the upper from the lower part of the Bloyd Formation. A pebble clast conglomerate is present at some localities at the base of this sandstone. In the southeastern corner of the quadrangle the "middle Bloyd sandstone" displays spheroidal weathering creating rounded columns. This along with a maze of enlarged joints creates an outcrop known as "Buzzards' Roost". Just across the drainage is a natural bridge known as "Rainbow Rock". The "middle Bloyd sandstone" is unconformable with the lower part of the Bloyd Formation. Approximately 80-120 ft. (24-37 m) thick.

Pbl — **Lower part** - Consists of interbedded very thin to thin ripple-bedded micaceous siltstones and sandstones that are fine to medium-grained interbedded with black clay to silty shales. Throughout the lower portion is black fissile clay to silty shales and thin sandstones interbedded with thin to thick-bedded fossiliferous carbonate to sandy carbonate layers. Thin pebble conglomerates are present within the interbedded shales and sandstones. The carbonate zones vary from red to gray on fresh and weathered surfaces and can be mottled. Sometimes the fossiliferous sandy zones look "rotten" due to decalcification. The quartz grains are medium-grained and sub-angular to sub-rounded. This unit contains abundant trace fossils and loading features. The contact between the lower part of the Bloyd Formation and the Prairie Grove is placed below a shaly layer conformable with the underlying massive calcareous sand of the Prairie Grove Member of the Hale Formation. Approximately 200-320 ft. (60-98 m) thick.

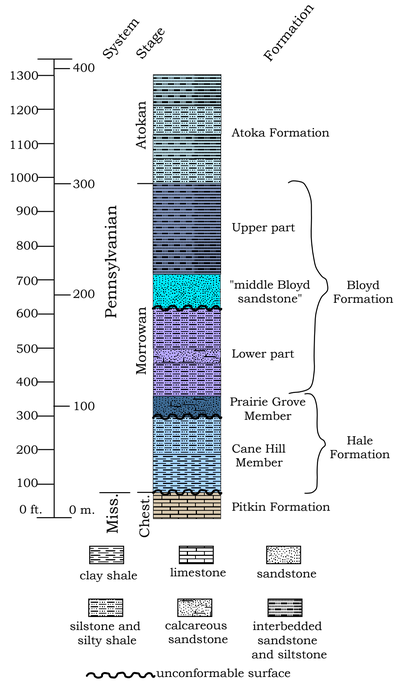
Php — **Hale Formation (Lower Pennsylvanian, Morrowan)** - The Hale Formation consists of two Members; the Prairie Grove Member and the underlying Cane Hill Member. Approximately 200-360 ft. (60-109 m) thick.

Prairie Grove Member - A fine to coarse-grained quartz sandstone with varying amounts of carbonate, crinoidal fragments and quartz pebbles. Reddish-gray to brown or mottled on fresh surfaces but weathers dark reddish-brown. Bedding varies from thin to massive and exhibits a rounded weathering profile. This unit often contains cross-beds, liesegang bands, and a pitted surface that is referred to as honeycomb weathering. The base of the Prairie Grove Member contains a fossiliferous quartz pebble conglomerate that contains clay drapes, limonite pebbles, and clasts of shale, siltstone, and sandstone. This unit becomes fairly thick along Hurricane Creek and has a natural bridge at the top of the unit. The Prairie Grove is a prominent bluff former throughout the quadrangle, and in the southern part of the quadrangle this unit sometimes forms a double bluff. It is becoming increasingly difficult to differentiate the Prairie Grove Member due to additional sandstone packages in the Hale Formation and the lower part of the Bloyd Formation in the southern half of the quadrangle. The Prairie Grove Member is unconformable with the Cane Hill Member. Approximately 40-80 ft. (12-24 m) thick.

Phc — **Cane Hill Member** - Consists of a gray to black fissile clay to silty shale in the lower portion that contains iron nodules and small limonitic box work fragments. The upper portion consists of thin-bedded, ripple-marked, micaceous siltstones and sandstones. Varies from black to dark-gray on fresh surfaces and light-gray and light-orange-brown on weathered surfaces. Trace fossils and lycopod fragments are abundant. This unit can form steep slopes but is susceptible to slope failure creating landslides. The Cane Hill Member is unconformable with the Pitkin Limestone. Approximately 160-280 ft. (48-85 m) thick.

Mp — **Pitkin Limestone (Upper Mississippian, Chesterian)** - A fine to coarsely crystalline often fossiliferous limestone containing crinoidal fragments, *Archimedes* bryozoans, gastropods, coral (rugose and colonial), and ooliths. The limestone beds in the top of the formation are sometimes sandy. Varies from light-gray to dark-gray on fresh surfaces, but usually weathers light or medium-gray and is thin to massive-bedded. Often has a petroliferous odor on freshly broken surfaces. Black clay shale (occasionally interbedded with limestone) occurs at the top of the Pitkin just beneath the Cane Hill Member of the Hale Formation. Sometimes this black shale contains crinoidal columnals. Only the uppermost portion of the Pitkin is exposed in a tributary to Hurricane Creek and a tributary to Piney Creek. Approximately 2 - 120 ft. (5 - 37 m) thick.

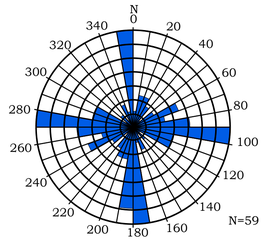
Stratigraphic Section



Symbols

- Contact
- Contact - inferred
- Fault (D-downthrown, U-upthrown)
- Fault - Inferred
- Fault - Concealed
- Monocline
- Strike and dip of inclined bedding

Joint Frequency



Rose diagram of strike frequency of joints recorded within the Fort Douglas Quadrangle.

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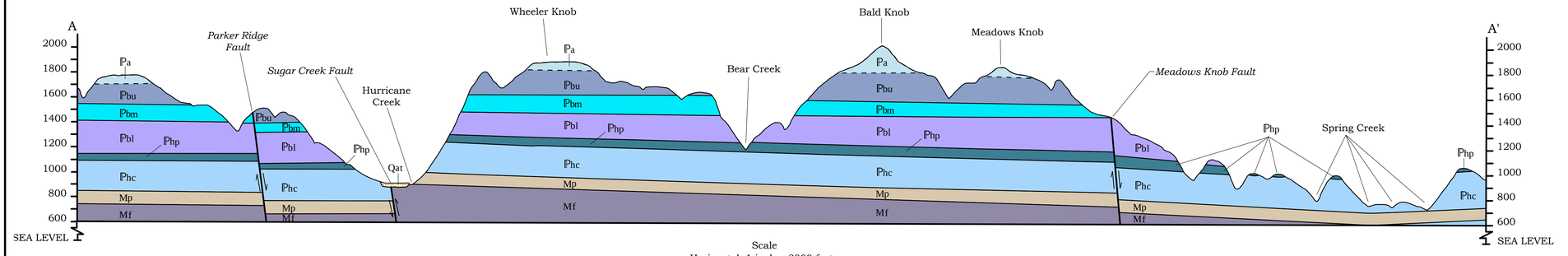

Scale
Horizontal: 1 inch = 2000 feet
Vertical: 1 inch = 500 feet (4X: Exaggeration)

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