

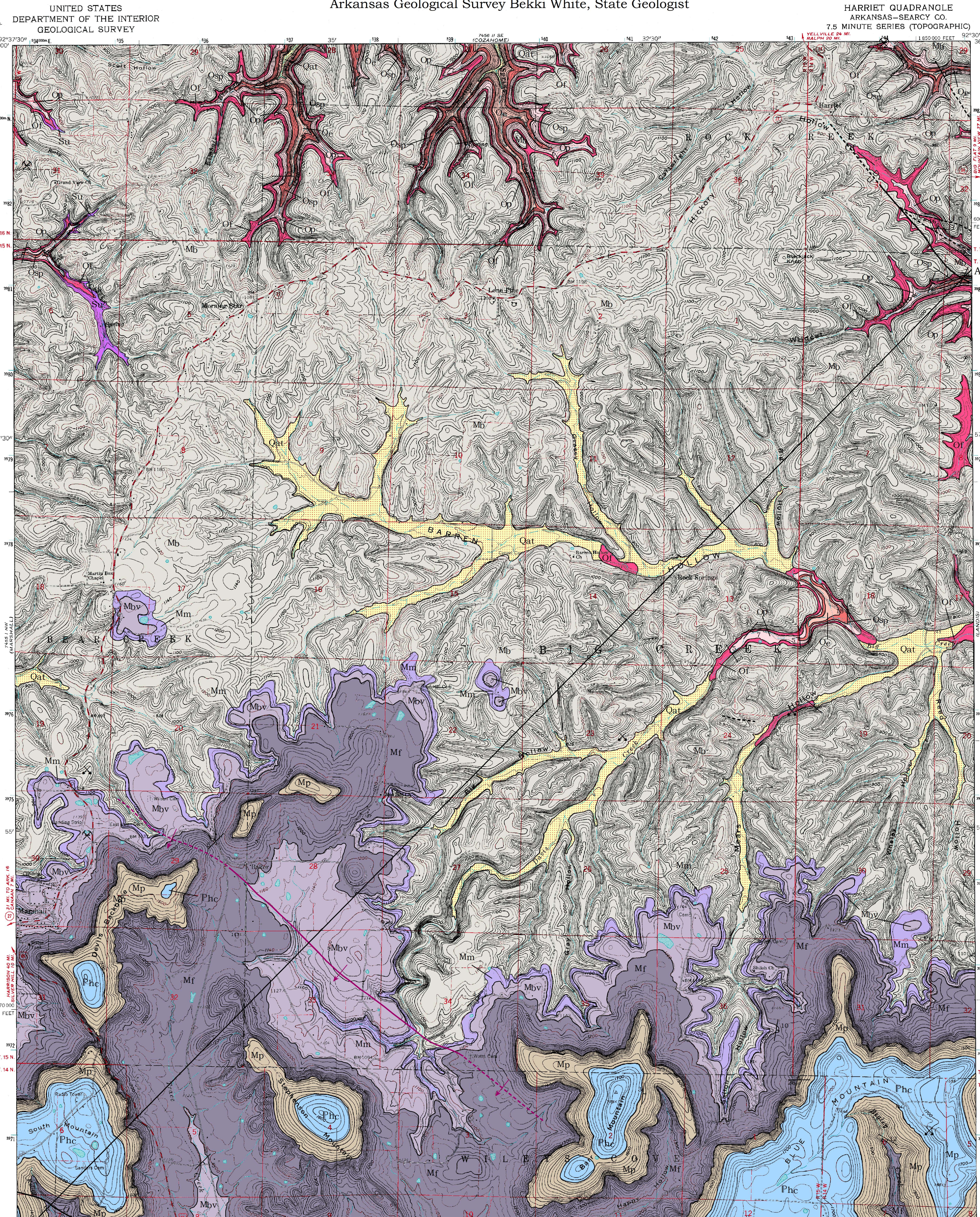
GEOLOGIC MAP OF THE HARRIET QUADRANGLE, SEARCY COUNTY, ARKANSAS

Geology by Erin E. Smart and Richard S. Hutto
 Digital compilation by Raymond H. Englerth
 2008

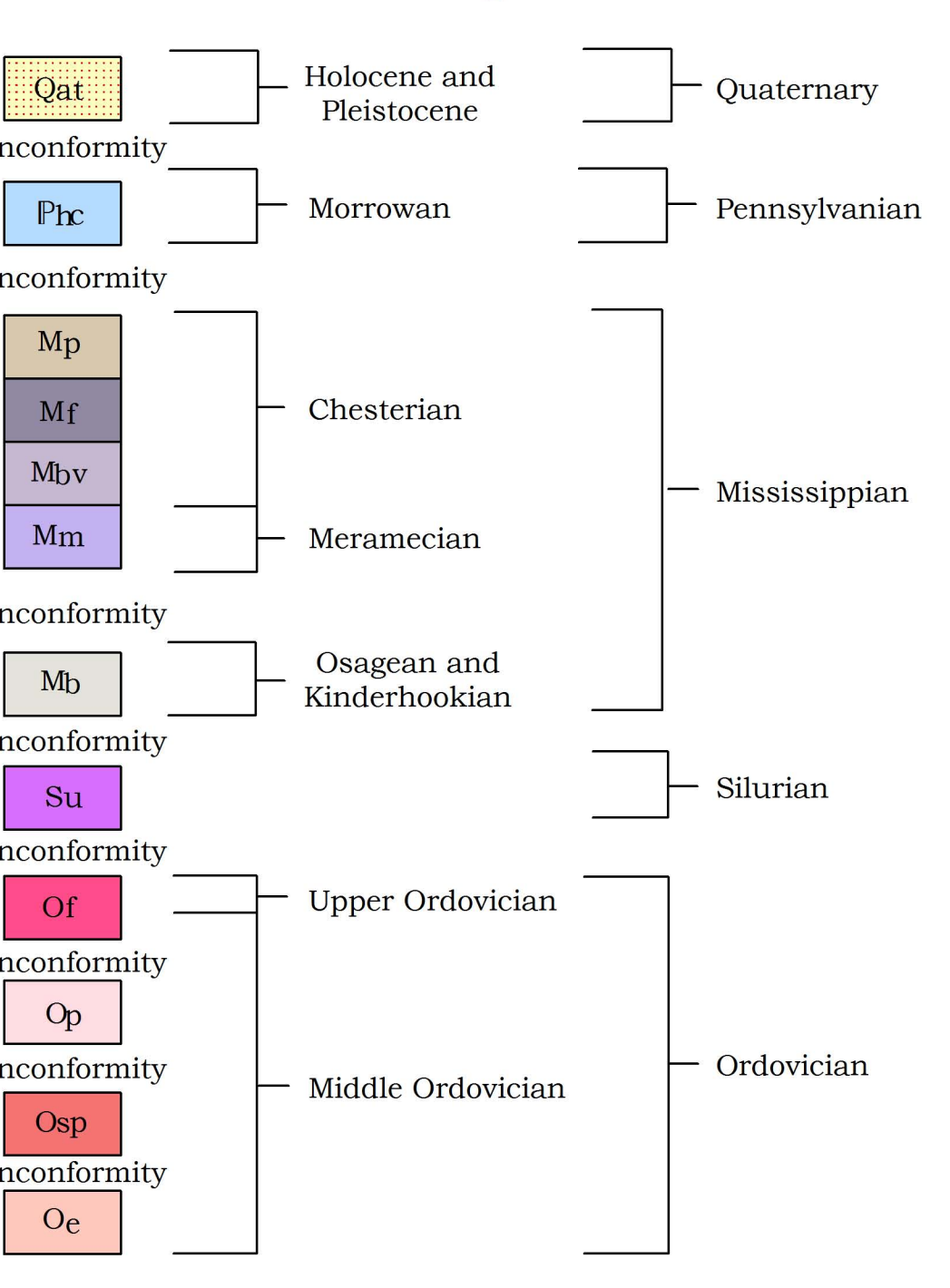
Arkansas Geological Survey Bekki White, State Geologist

HARRIET QUADRANGLE
 ARKANSAS—SEARCY CO.
 7.5 MINUTE SERIES (TOPOGRAPHIC)

DIGITAL GEOLOGIC QUADRANGLE MAP
 Harriet Quadrangle, AR
 DGM-AR-00374



Correlation of Map Units



Introduction

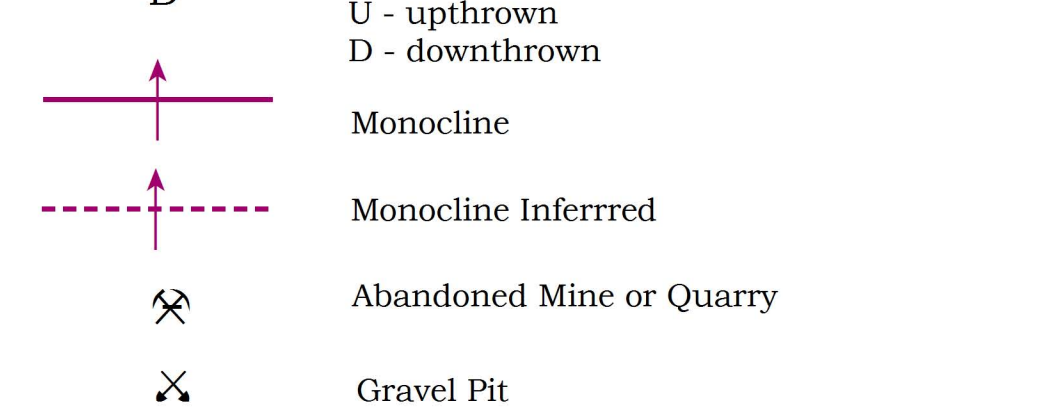
This map graphically summarizes the surface geology of the Harriet 7.5-minute quadrangle. Middle Ordovician to Lower Pennsylvanian age carbonate and clastic sedimentary rocks are exposed in this area. Most of the area lies on the Springfield Plateau with the northern escarpment of the Boston Mountain Range starkly evident to the south. The headwaters of Spring Creek and Big Creek, which flow into the Buffalo National River, are the major drainages on the Harriet quadrangle.

The geology of this quadrangle was previously mapped at the 1:24,000 scale in 1973 by E. E. Glick. The current map builds on the previous work while using a revised stratigraphy and adding certain stratigraphic refinements and structural details. The contacts and structural features on the map were derived from field observations at numerous sites. Site locations were generated with the aid of a global positioning satellite receiver. Bedrock dipping at less than 2° was considered horizontal. Bedrock formations less than 20' thick were not considered mappable units and were incorporated with adjacent stratigraphic units.

Description of Map Units

- Qat** Alluvium and terrace deposits (Quaternary) - Unconsolidated clay, silt, sand and gravel including deposits on one or more terrace levels.
- Ptc** Hale Formation (Lower Pennsylvanian, Morrowan) - The Hale Formation consists of two members: the Prairie Grove Member and the Cane Hill Member. Only the Cane Hill member is present in the mapping area.
 - Cane Hill Member** - Medium to very thick beds of very fine to fine-grained, moderately sorted, iron-cemented sandstone and shale. Generally, sandstone beds are massive in appearance. Crossbeds are commonly observed. Color varies from white to light brown and various shades of reddish brown in fresh exposure. Weathered surfaces appear dark gray or reddish brown, and sometimes display honeycomb textures. Weathered blocks can travel great distances downslope, and some localities (Baker knob NE of Devils Backbone) commonly show float of the Cane Hill sandstone along hill sides with little or no evidence of beds in place on hill tops. A unit of gray to black fissile clay shale to silty shale containing iron nodules and small limonitic box work fragments underlies the sandstone beds. The thickness of the shale ranges from 50 to 100 feet (15 to 31 meters), and thickness increases from east to west across the quadrangle. The shale unit is unconformable with the Pitkin below and is usually covered in the field. Thickness ranges from 0 to as much as 160 feet (49 meters).
- Mp** Pitkin Limestone (Upper Mississippian, Chesterian) - Thin to very thick bedded, fine to coarse-grained, oolitic, micritic or bioclastic limestone with occasional interbedded black, fissile clay shale. Generally, bedding is massive in appearance with occasional cross-beds near the upper contact. Typically contains abundant fossils including crinoid fragments, the bryozoan (*Archimedes*, corals (solitary and colonial), brachiopods, gastropods, and trilobites. Color ranges from dark gray to light-gray on fresh surfaces and typically weathers light or medium-gray but becomes more tan near the upper contact, possibly due to an increase in the silt content. The limestone often has a petroliculous odor when freshly broken. Interbedded shales become common in the upper 50 - 70 feet (15 - 21 meters) of the formation near the southern edge of the outcrop belt (Blue Mountain, Begley Creek). These shales consist of gray-brown to black, fissile, calcareous clay shale with interbedded limestone concretions. Abundant crinoid columns, often up to 1 inch (2.54 cm) in diameter, are present in this interval. The Pitkin Limestone is conformable with the Fayetteville Shale. Thickness ranges from 60 to 260 feet (18 - 80 meters).
- Mf** Fayetteville Shale (Upper Mississippian, Chesterian) - Black, fissile clay shale which becomes increasingly interbedded with thin to medium-bedded, gray to black, micritic to finely-crystalline limestone in the upper half of the unit. The micritic beds are sparsely fossiliferous, have a petroliculous odor when broken, and often form resistant, steep ledges. Near the contact with the Pitkin, interbedded black chert becomes more common. The lower shale unit forms a gentle slope above the Batesville sandstone. Thin-bedded limonitic siltstones that form sharp, angular floor blocks associated with very thin calcite-filled veins are locally present in the lower shale unit (Stephenson Mountain). Septarian concretions can be present in the upper and lower parts of the formation. Thickness ranges from 240 to 320 feet (73 - 98 meters).
- Mbv** Batesville Sandstone (Upper Mississippian, Chesterian) - Very fine to medium-grained, subangular, moderately sorted, iron-cemented sandstone. Thin to medium beds typically contain thin parallel laminations or cross-beds. Sandstones are light-brown to buff on fresh surface and weather to reddish brown to gray. Typically forms a flat plateau surface where present. Locally, a few beds of micritic to very finely crystalline, medium-bedded, light gray to gray limestone is present at the top (Baker area and Shiloh Hollow area). Thickness ranges from 20 to 100 feet (6 - 30 meters).
- Mm** Moorefield Formation (Upper Mississippian, Meramecian) - Silty shales with interbedded very thin to thin-bedded shaly siltstones. The shale zones are typically dark gray to black on fresh surface but weather dark gray with a yellowish tint. The siltstones are dark gray to dark-brown on fresh surface but weather light gray to buff. The Moorefield forms a gentle slope supporting the Batesville sandstone. The unit appears to be unconformable with the Boone throughout much of the mapping area. Thickness ranges from 20 feet to 60 feet (6 - 18 meters).
- Mb** Boone Limestone (Middle-Lower Mississippian, Osagean and Kinderhookian) - Coarse-grained fossiliferous and fine-grained limestones interbedded with anastomosing and bedded chert. Limestones are light to medium gray on fresh surface but usually weather to a dark gray. The cherts are white to dark-gray or red but usually weather a lighter color than the surrounding limestone. Locally contains dendritic manganese. A reddish brown weathered regolith layer consisting of chert fragments and clay is common at the top of Boone outcrops. Regionally, the undulating topography of the Boone is expressed as a flat surface (the Springfield Plateau) that is incised by steep-sided drainages. Karst features including springs, sinkholes and small caves are common. Thickness ranges from 50 to 400 feet (15 - 122 meters).
- Su** St. Joe Limestone Member (Middle-Lower Mississippian, Osagean and Kinderhookian) - Fine to medium-grained, thin to medium bedded crinoidal limestone which often contains very thin shaly limestones. Typically dark-gray to reddish in color but locally can be light gray to black. Manganese-rich (Little Rocky Creek) beds typically are darker in color. Often contains pyrite as individual crystals or clusters, or if weathered as limonitic blebs. Stratigraphically, the unit commonly rests directly on the Fervale Limestone or above the basal sandstone, but lies directly above the Plattin in the drainages west of Mill Hollow and Spring Branch and in South Breton Creek. Thickness ranges from 2 to 20 feet (0.5 - 6 meters).
- Of** Undifferentiated (Silurian) - These limestones are each noted at two locations, Rocky Creek and Little Rocky Creek, in the northeast corner of the quadrangle. Because individual formations are generally less than 20' thick, the formations are grouped together and treated as an undifferentiated unit on the map. Combined thickness of the formations ranges from 0 to 60 feet (0 - 18 meters).
- Op** Lafferty Limestone - Medium to thick-bedded, micritic to very finely-crystalline limestone. Color ranges from gray to reddish gray to brown with reddish blebs throughout. The Lafferty rests unconformably on the St. Clair.
- Ocp** Brassfield Limestone - Thick to very thick bedded, coarse to very coarsely-crystalline, massive limestone. Color ranges from light-gray to dark-red. Vugs (1 - 5 cm) are common throughout the formation and are typically filled with calcite and buff colored, very fine silt or clay. Fossil types present in this unit include crinoids, bryozoa, and brachiopods. The Brassfield rests unconformably on Ordovician rocks.
- Oc** Caeson Shale (Upper Ordovician) - This formation was observed at only two locations in this quadrangle: Rocky Creek and in a road cut in SE1/4, NW1/4, Sec. 13, T15N R15W along the Barren Hollow drainage. The shale is silty and calcareous and often contains phosphate nodules. Color ranges from blotchy medium gray to black on fresh surfaces and weathers greenish buff or dark brownish black. Thickness ranges from 1 to 5 feet (0.3 - 1.5 meters), therefore the unit is not considered to be a mappable unit and is grouped with the Fervale Limestone.
- Of** Fervale Limestone (Upper Ordovician) - Medium to thick-bedded, medium to coarsely-crystalline limestone. Generally the limestone beds are massive in appearance. Color ranges from white to light-gray with a pink to reddish tint or mottled appearance on fresh surfaces. Weathers light to dark-gray. Fossils occurring in this formation include barrel-shaped crinoid columns, corals and brachiopods that are accentuated on weathered surfaces. Weathered exposures of the Fervale occur as rounded, lichen and moss-covered masses that are usually friable. Throughout this quadrangle, the absence of the Kimmewick Limestone indicates that Fervale is unconformable with the underlying Plattin Limestone. Thickness ranges from 0 to 60 feet (0 - 13 meters), but is typically 10 to 20 feet (3 - 6 meters).
- Op** Plattin Limestone (Middle Ordovician) - Very thin to thick bedded, micritic limestone that sometimes displays a sugary texture. Color is light to dark-gray on fresh surfaces weathering white to dark-gray. A tan to buff siltstone is present at the top of the formation at a few localities (notably around South Breton Creek). The unit typically forms persistent, blocky ledges. Springs commonly emerge at or near the contact with the St. Peter Sandstone below. Throughout the mapping area, the Plattin rests unconformably upon the St. Peter Sandstone. Thickness ranges from 40 to 80 feet (12 - 24 meters) but is typically about 60 feet (18 meters).
- Osp** St. Peter Sandstone (Middle Ordovician) - Fine to medium-grained, angular to rounded, well sorted, calcite-cemented sandstone. The unit is friable where the calcite is leached out of the sandstone matrix. Bedding is thick to very-thick bedded, is massive to cross-bedded, and forms either concave or convex rounded ledges. Color is typically light-tan to white or greenish-white on fresh surfaces but weathers gray to dark-gray. The St. Peter commonly acts as a confining unit to groundwater flow and therefore produces many springs and seeps along its upper contact with the Plattin Limestone. Often these springs are marked by travertine deposits. The unit commonly forms bluffs along creeks and steep hillsides. Outcrops and loose boulders commonly contain *Scotolites* (Adams et al. 1904), a trace fossil that forms vertical tubes of more resistant sandstone that when weathered resemble tightly packed icicles in section view. The St. Peter rests unconformably on the Everton and the contact is typically an undulatory surface indicating that the unit likely eroded and cut down into the underlying Everton. Thickness ranges from 20 feet to 60 feet (6 - 18 meters) but is typically 30 to 40 feet (9 - 12 meters).
- Oc** Everton Formation (Middle Ordovician) - Very fine to finely-crystalline sandy and limy dolostones that are thin to massive bedded. Color is medium to dark-gray on fresh surfaces but weathers to a lighter gray. Dolostones are often mottled and contain stromatolites, mudcracks, and calcite and dolomite-filled veins and vugs. Thin-bedded intervals near the top of the unit are often deformed along the contact with the St. Peter. Freshly broken surfaces have a strong petroliculous odor. Exposures in this quadrangle range from 6 inches up to 160 feet (0.2 to 49 meters).

Symbols



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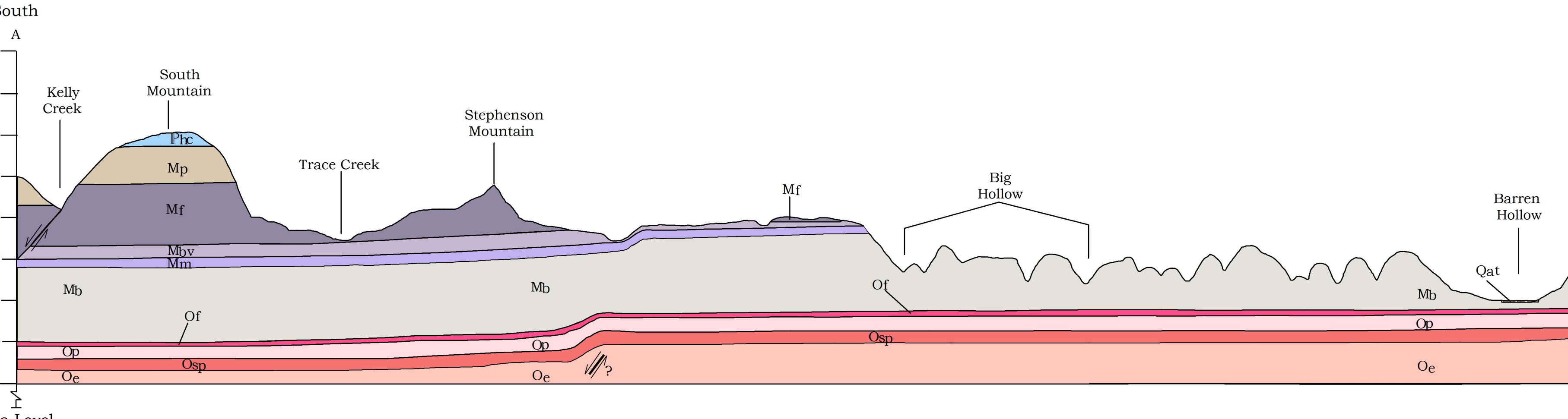
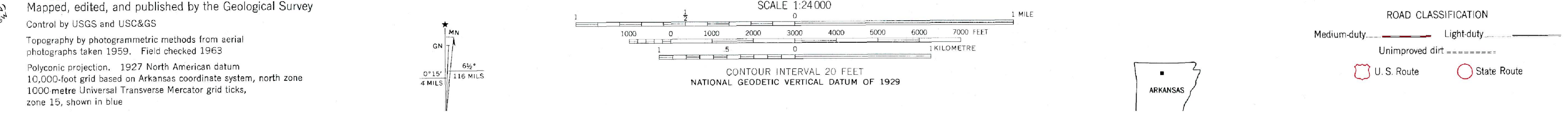
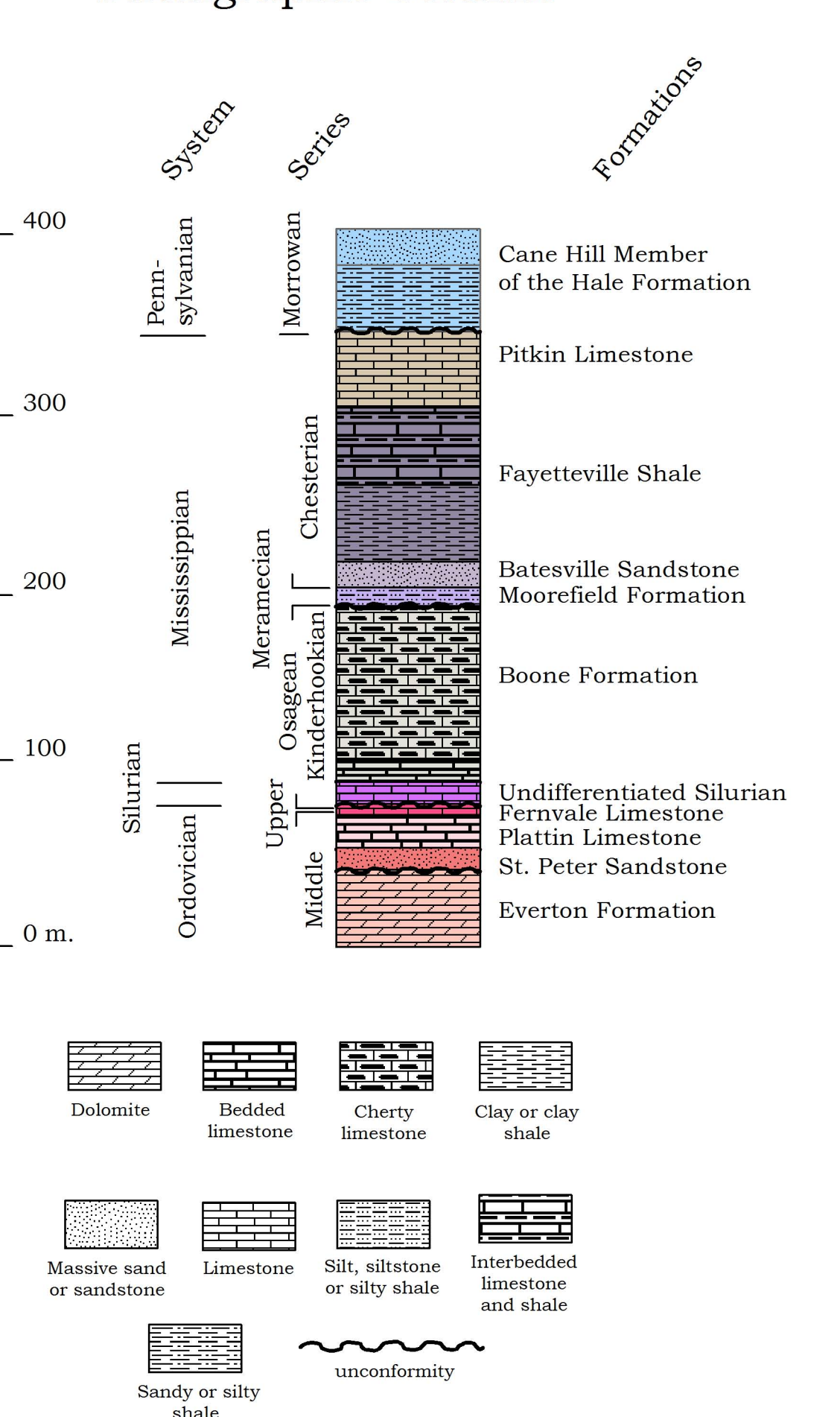
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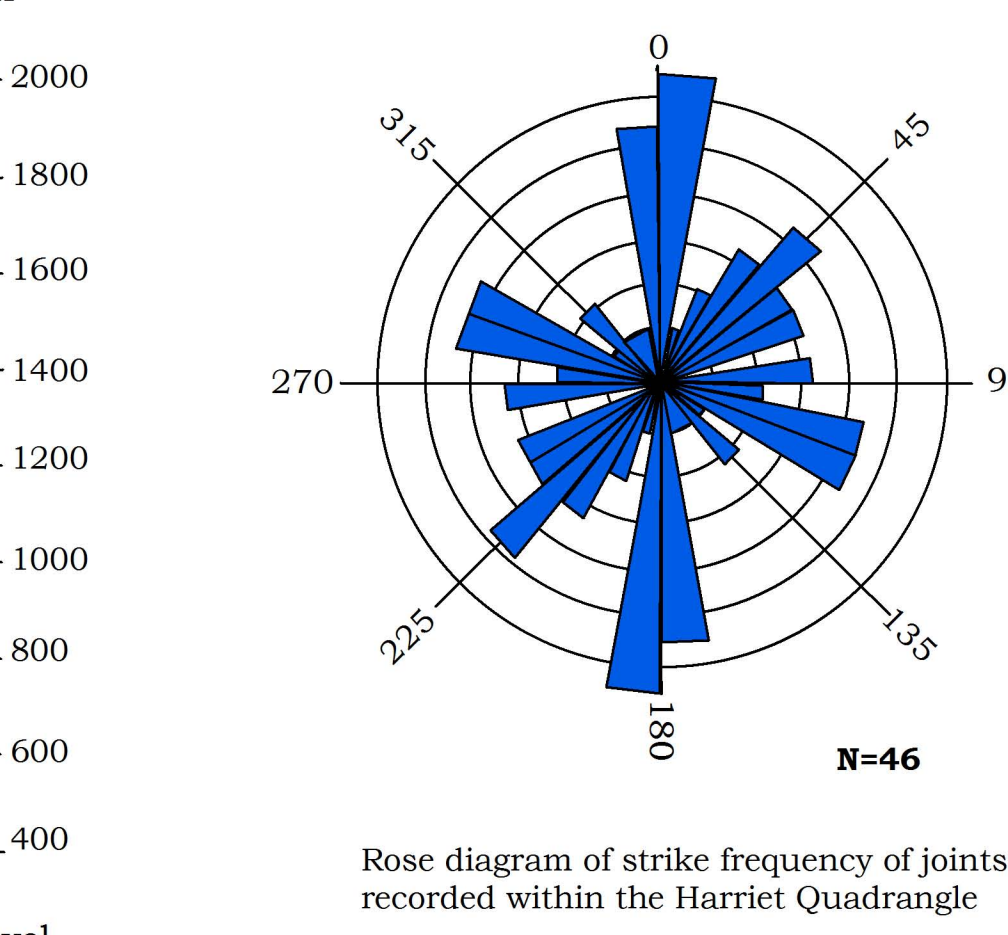
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Stratigraphic Column



GEOLOGIC CROSS SECTION A-A'
 Horizontal Scale 1 in. = 2000'
 Vertical Scale 1 in. = 400'
 Exaggeration = 5X

Joint Frequency



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