

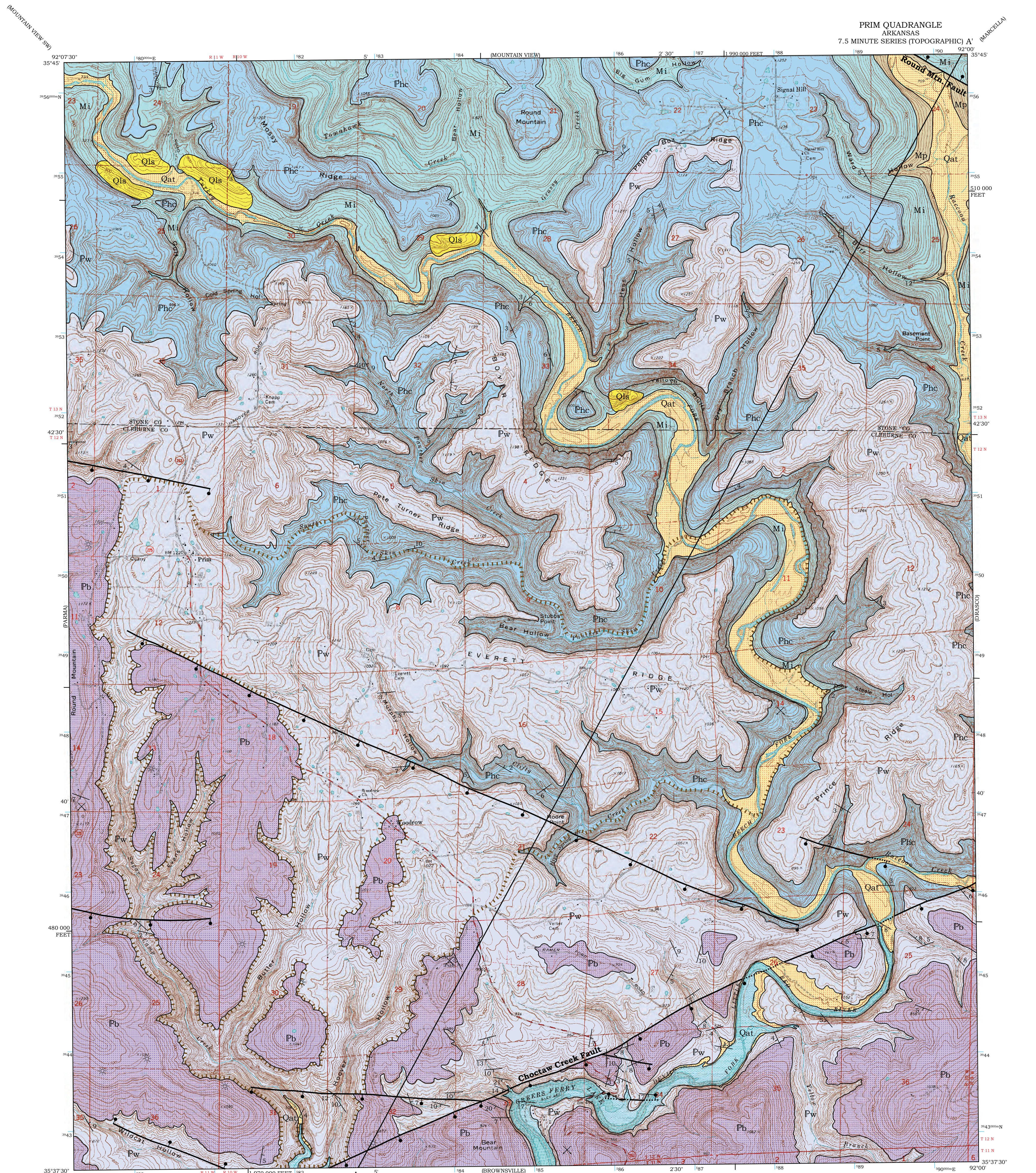


Arkansas Geological Survey
Becki White, State Geologist and Director

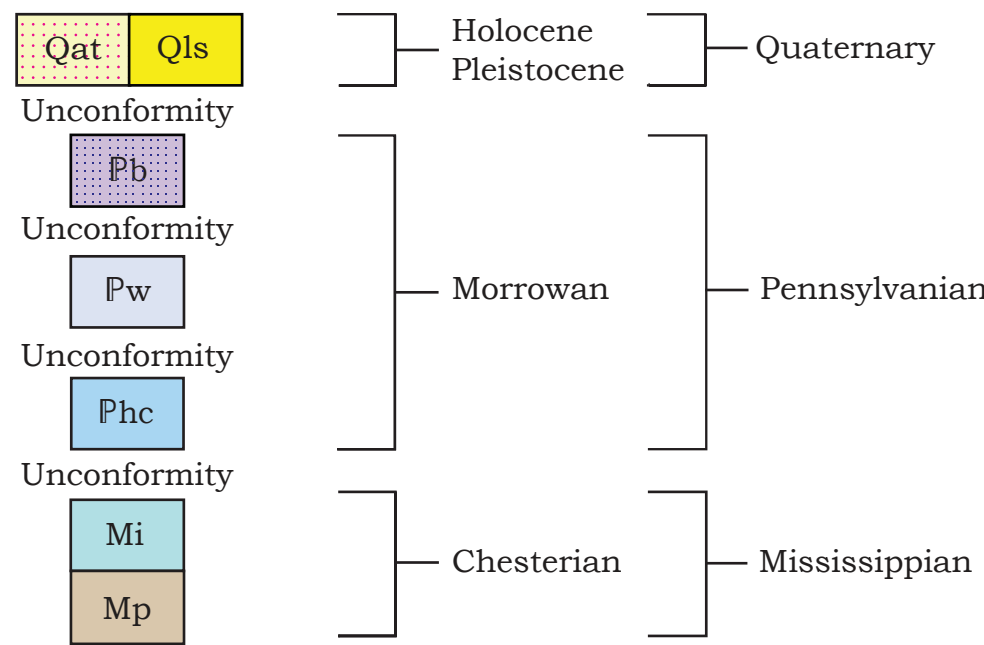
Geologic Map of the Prim Quadrangle, Cleburne and Stone Counties, Arkansas

Richard S. Hutto and Ty C. Johnson
2015

Digital Geologic Quadrangle Map
Prim Quadrangle, Arkansas
DGM-AR-00720



Correlation of Map Units



Description of Map Units

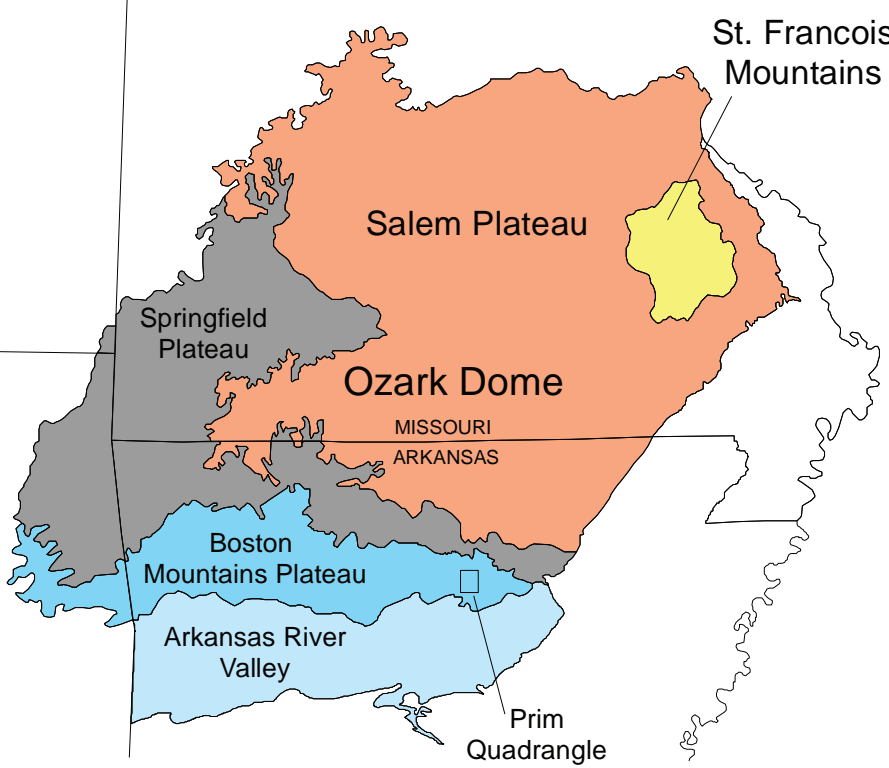
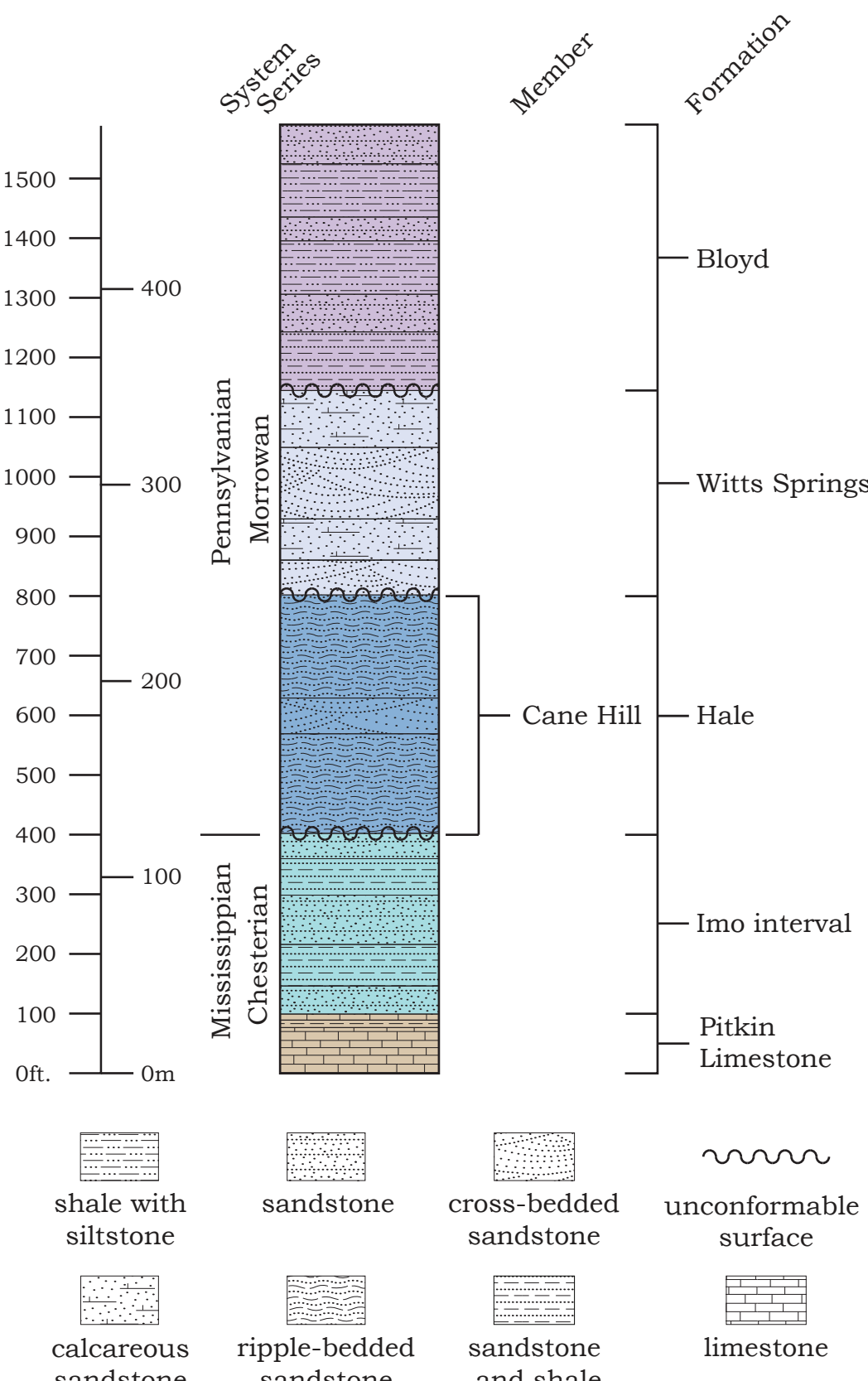
Qat **Alluvial terrace (Quaternary)** - unconsolidated clay, silt, sand, and gravel along streams deposited on one or more terrace levels.

Qls **Landslide deposits (Quaternary)** - a mass of rock and debris that has moved downslope. Failures of this type are typical of the Cane Hill Member of the Hale Formation and the Imo interval on slopes where thick sandstone units are underlain by incompetent shale units.

Pb **Blond Formation - undifferentiated (Lower Pennsylvanian, Morrowan)** - consists of sandstone, siltstone, and shale in sequences up to 100 feet (30 meters) thick. Sandstone is medium to thick bedded, irregular or lenticular bedded. Grain size is very fine to fine. Tan on fresh surfaces but weathers brown and blocky. Commonly contains stylolites, scour-and-fill structures, and fossil wood casts and molds. Locally micaceous. Contains shale-partings, shale and/or quartz pebbles, ironstone concretions, and liesegang banding. 100 feet (30 meters) of orange, friable sandstone caps the thicker sections south of the Choctaw Creek Fault. It is massive, rounded, fine to medium grained, and contains shale pebbles at the base. Shale and siltstone are dark gray on fresh surfaces but weather tan to orange. Unconformable with the Witts Springs Formation. Up to 440 feet (134 meters) exposed.

Pw **Witts Springs Formation (Lower Pennsylvanian, Morrowan)** - consists of sandstone, limy sandstone, sandy limestone, and minor shale and siltstone. Sandstone is typically medium to thick bedded, commonly cross bedded, and locally thin bedded. Weathering commonly masks bedding so that it appears massive, and either friable and rounded or blocky. A prominent bluff-former, commonly with a rockshelter at its base. Exfoliation of massive sandstone along stream beds produces a characteristic concave resistant. Grain size is typically very fine to fine, but locally medium to coarse. Orange to buff on fresh surfaces, but weathers gray to brown, or orange. Commonly contains quartz pebbles, shale pebbles, liesegang banding, honeycomb weathering, and trace fossils. Locally contains coal stringers and fossil wood prints (casts and molds) including *Calamites* and *Leptodendron*. Locally exhibits soft-sediment deformation and overturned cross-beds. Discontinuous units up to 140 feet (43 meters) thick of fine-grained, interbedded limy-sandstone and sandy-limestone are deeply solutioned, cross bedded, and fossiliferous. Fossil fragments include crinoids, corals, brachiopods, and ammonoids. Shale units are silty to clay, typically dark gray to black on fresh surfaces but weather tan to orange. Unconformable with the Cane Hill Member of the Hale Formation. Up to 340 feet (104 meters) exposed.

Stratigraphic Column



Modified from Shepherd et al., 2011

Introduction

This map depicts the bedrock and surficial geology of the Prim 7.5-minute quadrangle. In this area, approximately 1470 feet (448 meters) of Late Mississippian through Early Pennsylvanian (late Chesterian through Morrowan) carbonate and clastic sediment was deposited in nearshore fluvial and deltaic environments. Regionally, the mapped area is situated on the southern flank of the Boston Mountains Plateau. This is the southernmost of a series of plateau surfaces called the Ozark Plateaus. Structurally, the Ozark Plateaus is controlled by an area of uplift centered in the St. Francois Mountains of south-east Missouri known as the Ozark Dome. Topography of the quadrangle is rugged and steep with a relief of 850 feet (259 meters). It exhibits typical bench and bluff topography due to differential weathering of the sandstone and shale units, and it is strongly dissected by streams. Some valley floors are flat, but narrow canyons with steep walls are more typical. The Devil's Fork of the Little Red River (also named Beech Fork and Turkey Creek upstream) is the main drainage in the quadrangle and is a major tributary of Greers Ferry Lake. Overall, strata dip an average of about one degree to the south.

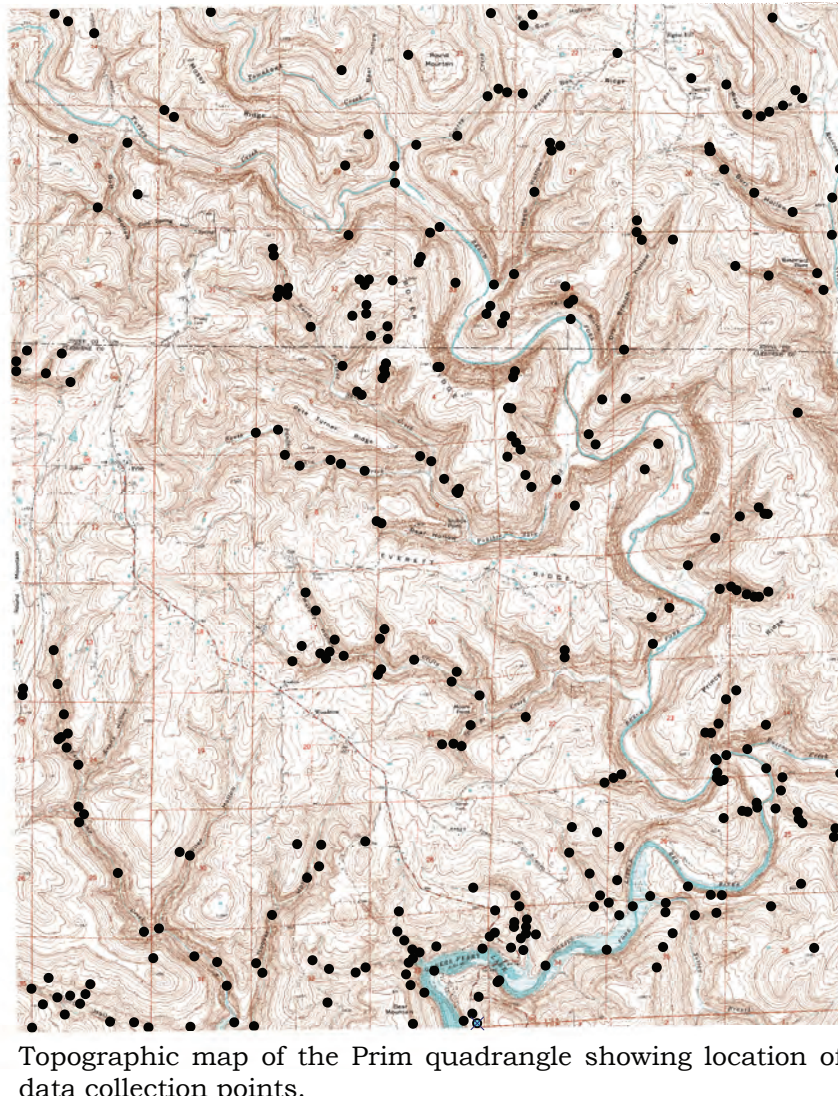
The area around Prim, Arkansas has long been known for spherical boulders (cannonball concretions) that commonly range from one foot (0.3 meters) to more than 4 feet (1.3 meters) in diameter. While not unique to the area, their size and abundance are notable. These concretions are composed of case-hardened, iron-cemented sandstone and persist after the less resistant host rock has weathered away (Hanson and Howard, 2005). It is theorized that their shape may be due to a chemical process whereby dissolved iron has precipitated in the form of, or perhaps replaced, the radial growth pattern that was initially produced by calcite cement (McBride and Miliken, 2006). They appear to originate in the upper third of the Witts Springs Formation but many have moved downslope or been transported by creeks. The area of greatest known concentration of these boulders is outlined with brown tie marks.

The geology of this area was mapped circa 1973 by E. E. Glick at the 1:100,000 scale for the Geologic Map of Arkansas. This map uses a more comprehensive stratigraphic section and depicts structural features in greater detail. The contacts and structures are based primarily on field observations made from July 2014 to April 2015. Locations of data collection sites were recorded with a global positioning satellite receiver.

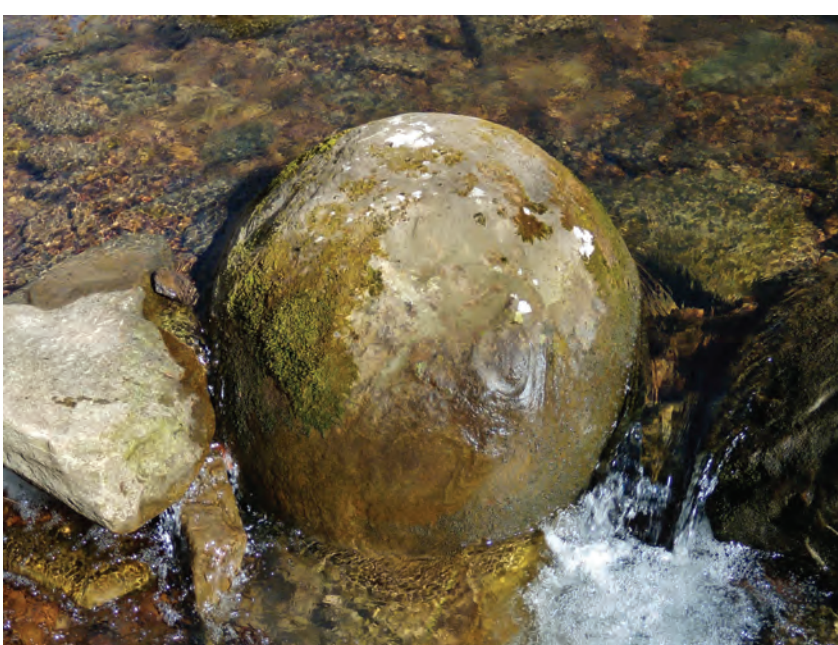
Phc

Mi

Mp



Topographic map of the Prim quadrangle showing location of data collection points.

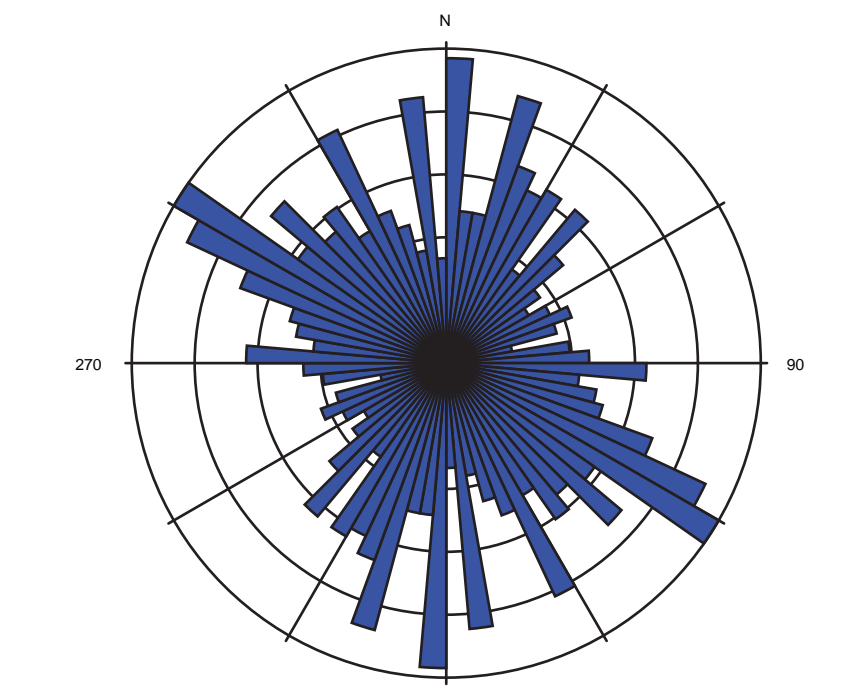


Prim boulder (cannonball concretion) in Sugar Camp Creek

Symbols

- Contact
- Normal fault - dotted where concealed; bar on downthrown side.
- Area of concentration of Prim boulders
- Inclined bedding showing direction and magnitude of dip
- Gas well
- Gravel pit
- Line of cross-section

Joint Frequency



Rose diagram of strike frequency of joints recorded within the Prim quadrangle

Geologic Cross-Section A-A'

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

