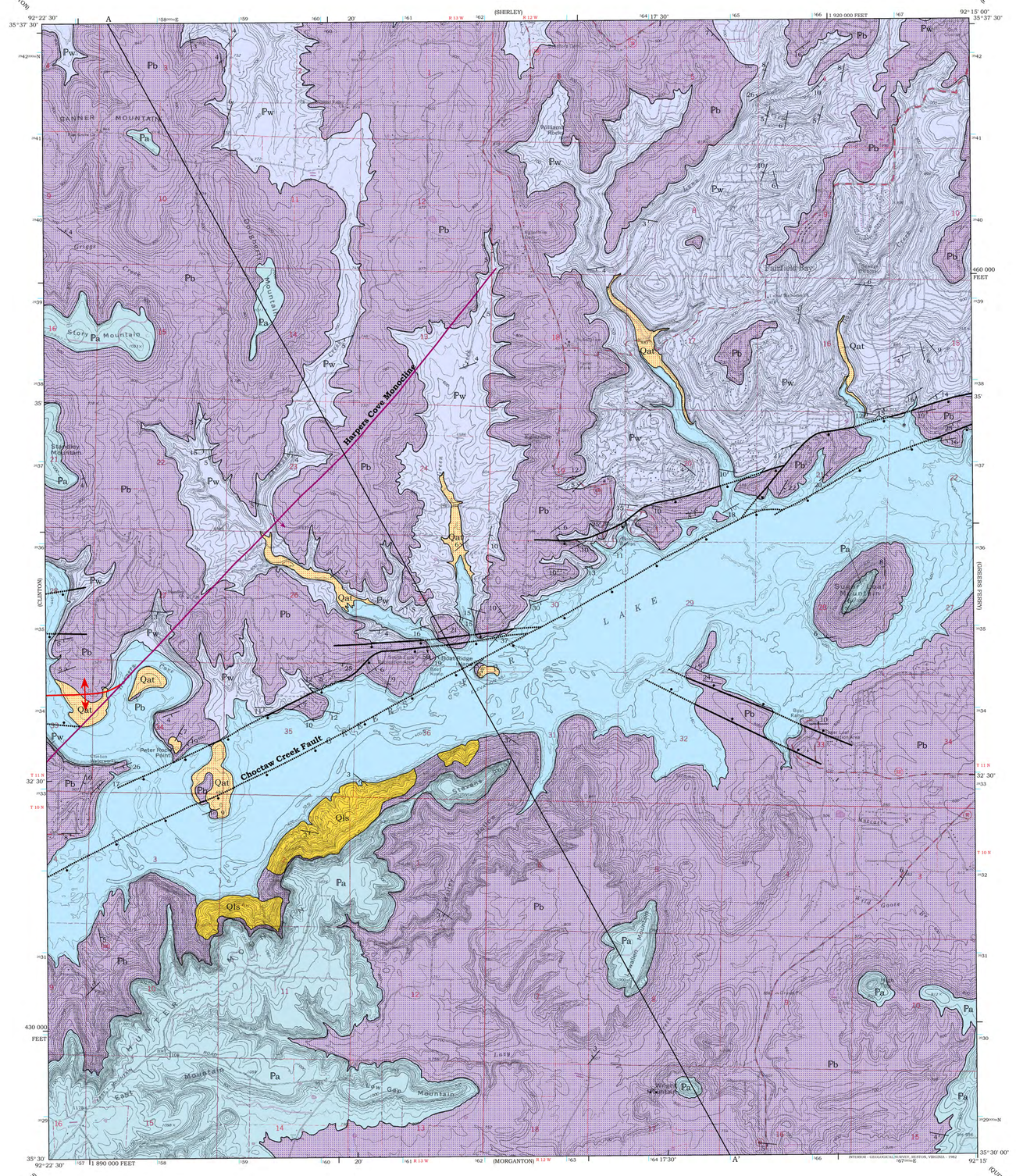
Arkansas Geological Survey
Bekki White, State Geologist and Director

Digital Geologic Quadrangle Map
Fairfield Bay Quadrangle, Arkansas
DGM-AR-00276

Geologic Map of the Fairfield Bay Quadrangle, Van Buren County, Arkansas

Richard S. Hutto and Daniel S. Rains

2014



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 and photorevised in 1981. Some of the colors of the original map have been modified, and it is displayed at 40% transparency.

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

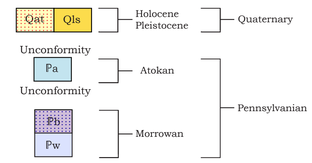
0°33'
TRUE NORTH
MAGNETIC NORTH
Approximate mean declination 2013

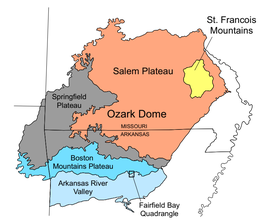
SCALE 1:24 000
1 1/2 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 .5 0 1 KILOMETER
Contour Interval 20 Feet
National Geodetic Vertical Datum of 1929

QUADRANGLE LOCATION

Road Classification
Secondary highway
Light duty road
Unimproved road
State Route

Correlation of Map Units





Modified from Shephard et al., 2011

Introduction

This map depicts the bedrock and surficial geology of the Fairfield Bay 7.5-minute quadrangle. In this area, approximately 1300 feet (396 meters) of early Pennsylvanian (Morrowan through Atokan) clastic sedimentary rocks are exposed at the surface. Regional geology of the Fairfield Bay quadrangle is controlled by an uplift centered in the St. Francois Mountains of southeast Missouri known as the Ozark Dome. Progressively younger rocks form a series of plateau surfaces - the Ozark Plateaus - from the core of the dome southward into Arkansas. This map straddles the boundary between the southernmost and highest of the plateau surfaces - the Boston Mountains Plateau - and the Arkansas River Valley. The Arkansas River Valley is typified by broad, east-west trending folds and faults and represents the northern extent of the Ouachita orogenic system in Arkansas.

The geology of the Fairfield Bay quadrangle was mapped circa 1973 by E. E. Glick for the 1:500,000 scale Geologic Map of Arkansas. This map builds on previous work but uses a more detailed stratigraphic section and depicts structures in greater detail. The contacts and structural features are based primarily on field observations made from July 2013 to April 2014. Locations of data collection sites were recorded with a global positioning satellite receiver. Bedrock inclined at less than 2° is shown as horizontal.

Symbols

Contact

Normal fault - bar and ball on downthrown side. Dotted where concealed

45 — Indicates orientation of fault plane

5 — Inclined bedding showing direction and magnitude of dip

Inactive gravel pit

A — A' Cross-section line

Anticline axis

Monocline axis

Description of Map Units

Qat — **Alluvial terrace (Quaternary)** - Unconsolidated clay, silt, sand, and gravel 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 more prevalent in the shale units of the Bloyd Formation.

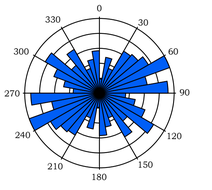
Pa — **Atoka Formation (Lower Pennsylvanian, Atokan)** - Mostly thin- to thick-bedded, very fine-grained, very silty sandstone interbedded with shale. Sandstone commonly crops out as a sequence of gradually thickening- and coarsening-upward packages. Brown to orange when freshly broken; tan to gray, or less commonly, bright orange to red after weathering. Locally contains white shale-pebble conglomerate, scour and fill structures, and stylolitic surfaces. Shale is typically dark-gray when freshly exposed and tan after weathering. Conformable with the underlying Bloyd Formation. Up to 360 feet (110 meters) thick.

Pb — **Bloyd Formation (Lower Pennsylvanian, Morrowan)** - Primarily shale with lesser siltstone and very thin- to thin-bedded sandstone. Where present, the basal sandstone is typically thin- to very thick-bedded, medium- to coarse-grained, and commonly forms rounded bluffs and chimneys. Usually buff to tan to brown both on freshly broken surfaces and after weathering. This lithology is mostly confined to the lower 100 feet of the Bloyd Formation. Sandstone in the upper part is very fine-grained to silty and thin-bedded, though grain size and bedding thickness vary locally. Commonly bioturbated and very micaceous. Ranges from red to orange to brownish-gray or gray on both fresh and weathered surfaces. Milky-white quartz-pebble conglomerate, crossbedding, stylolites, wood prints, scour and fill structures, and dewatering features are common. Shale intervals are abundant but rarely exposed. Typically black to dark-gray on fresh surfaces and tan to red to light-gray after weathering. Locally the shale is fossiliferous or is interbedded with limey sandstone or fossiliferous limestone. The fossiliferous limestone contains abundant crushed rugose corals, fragmented bryzoans, limonitic siltstone concretions, septarian concretions, and brecciated concretions. Locally contains limonitic boxwork. Lithologies of this type are prone to mass wasting events such as landslides. Unconformable with the underlying Witts Springs Formation. Ranges from 260-320 feet (79-97 meters) thick.

Pw — **Witts Springs Formation (Morrowan)** - Primarily consists of very fine- to fine-grained, bluff-forming sandstone with interbedded shale units. The sandstone is typically thin- and ripple-bedded or massive-bedded and very fine-grained, though locally medium-grained and rarely coarse-grained. Typical colors are gray to light-brown to orange when freshly broken and brown to light-gray after weathering. A wide variety of other colors are present locally. Usually calcareous or punky where calcite has leached out. Where calcareous, beds commonly alternate between light- and dark-brown depending on calcite content. Locally fossiliferous. Fossils are fragmentary and typically include crinoids and brachiopods, which are most common, and rugose corals, gastropods, ammonoids, conical nautiloids, and bryozoans. Commonly micaceous and bioturbated. Typical sedimentary structures include scour and fill, lamination, and flaser bedding. Locally contains conglomeratic intervals, liesegang-banding, stylolites, concretions, load-casts, shale-partings, and honeycomb weathering. Shale is typically dark-gray to black when freshly broken and tan to brown after weathering. Commonly interbedded with very fine-grained to silty sandstone. Locally contains limonitic concretions. Up to 560 feet (171 meters) thick.

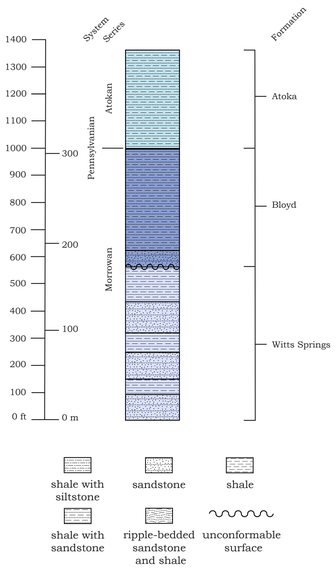
Interbedded siltstone and shale in the upper Witts Springs Formation. Note strata-bound soft sediment deformation intervals

Joint Frequency

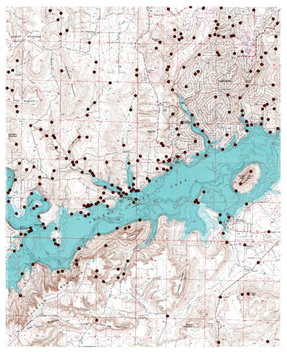


Rose diagram of strike frequency of joints recorded within the Fairfield Bay quadrangle

Stratigraphic Column



Rounded knob of the basal sandstone, Bloyd Formation



Topographic map of the Fairfield Bay quadrangle showing location of data collection sites (dots).

References

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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 data is collected, the contacts and structures depicted on this map may be changed.

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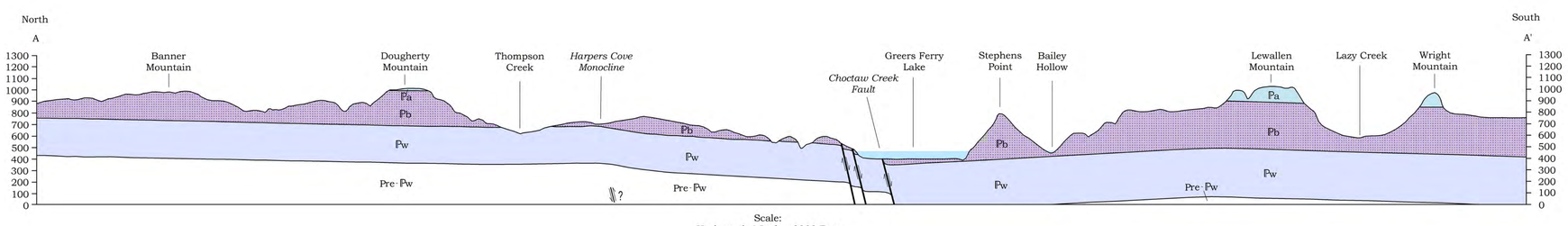

Scale:
Horizontal: 1 Inch = 2000 Feet
Vertical: 1 Inch = 500 Feet (Exaggeration: 4x)

Map and cross-section digitized by Brian Kehner