# Arkansas Geological Survey Bekki White, Director and State Geologist

DEPARTMENT OF THE INTERIOR

Topography mapped, edited, and published by the U.S. Geological Survey

10,000-foot grid based on Arkansas coordinate system, northzone

Fine red dashed lines indicate selected fence and field lines where

generally visible on aerial photographs. This information is unchecked

1,000 0 1,000 2,000 3,000 4,000 5,000 6,000 7,000

CONTOUR INTERVAL 20 FEET

NATIONAL GEODETIC VERTICAL DATUM OF 1983

Feet

Control by USGS AND USC&GS

zone 15, shown in blue

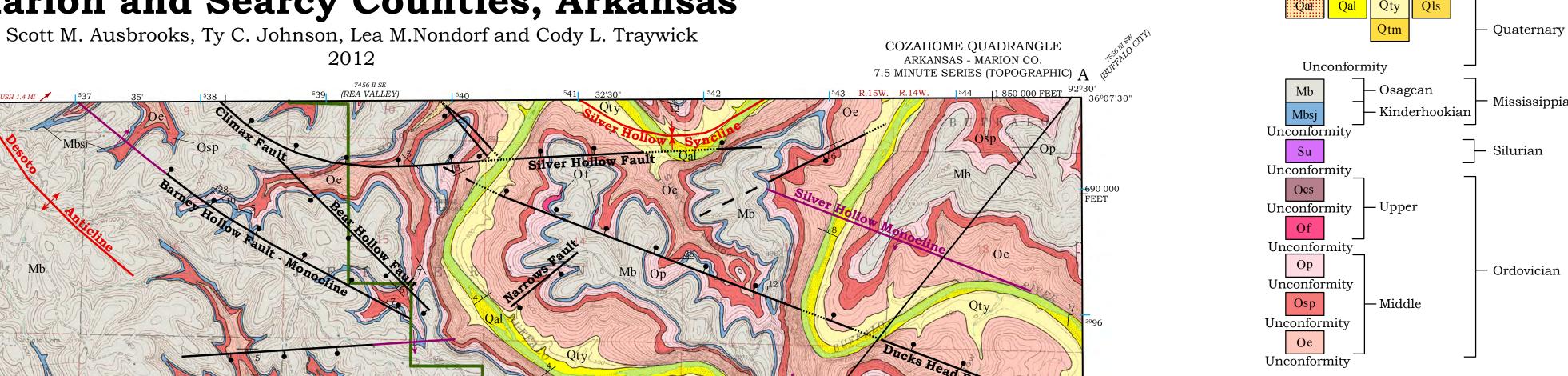
Topography by photogrammetric from aerial

photographs taken 1964. Field checked 1966

Polyconic projection. 1983 North American datum

1000-meter Universal Trnsverse Mercator grid ticks,

# Geologic Map of the Cozahome Quadrangle Marion and Searcy Counties, Arkansas



### Introduction

Correlation of Map Units

This map illustrates the surface geology of the Cozahome 7.5 minute quadrangle. This quadrangle was previously mapped by W.V. Bush and B.R. Haley in 1970 for the Geologic Map of Arkansas (1976). E.T. McKnight (1935) mapped the Cozahome as part of a larger (1:125,000-scale) map focused on the understanding of the lead and zinc deposits of the area. Structural contours on the base of the Boone Formation were adapted from McKnight (1935). This map incorporates previously collected data with new detailed geologic mapping. The contacts and structural features were based on field observations. Data collection points were recorded by using a Global Positioning System (GPS) receiver in conjunction with a U.S. Geological Survey 7.5-minute topographic map. Bedrock dipping less than 3° was considered horizontal. Bedrock units of less than 20 feet thick were considered "not mappable" at a 1:24,000-scale and were incorporated into adjacent stratigraphic units. Approximately 23 miles (37 kilometers) of the Buffalo National River are located on this quadrangle and are managed by the National Park Service.

Stratigraphically, approximately 1200 feet (366 meters) of Middle Ordovician to Mississippian age strata are exposed in this quadrangle. Middle Ordovician strata crop out in the drainages and on steep hillsides. The Upper Ordovician Fernvale Limestone is present predominantly in the southern portion of the quadrangle. The Cason Shale was observed only at two localities. Undifferentiated Silurian Limestone is present in Scott Hollow in the southwest corner. The Mississippian Boone Formation caps the ridge tops and forms the heavily dissected Springfield Plateau surface. Quaternary terrace and alluvium deposits are present in the valleys of Water Creek, the Buffalo River and its tributaries. Two terrace levels are well-developed along the Buffalo River: a younger and a medial.

Regional structure is controlled in large part by an uplifted area (known as the Ozark Dome) centered in southeastern Missouri. From this structural high, the progressively younger rock formations dip southward and form increasingly elevated plateau surfaces (Ozark Plateaus Region) in Arkansas. Locally, certain areas of bedrock have been deformed by both large and small faults and folds. Structural highlights of the Cozahome include several northwest-southeast trending normal faults that are en echelon southwest-northeast across the map. One notable exception is the Caney Hollow Fault-Monocline which trends from the southwest-northeast in the west part of the map. Some of the faults and monoclines of the Rush Lead and Zinc Mining District extend onto the northern part of the map. Several monoclines and fault-to-monoclines are present in the quadrangle. They include the Barney Hollow Fault-Monocline, Caney Hollow Fault-Monocline, Fish Trap Hollow Fault-Monocline, North Coon Hollow Fault-Monocline, Commissary Ridge Fault-Monocline, Ingram Creek Fault-Monocline and Silver Hollow Monocline. The De Soto, Salgado, Jones Hollow and Kimball Creek Anticlines form four elongated asymmetrical domes. The Panther Creek, Rock Creek and Silver Hollow Synclines form three elongated asymmetrical basins.

Northeast-southwest trending faults include: North Rocky Creek, South Coon Hollow, Water Creek and Hickory Creek. They are all downthrown to the southwest and their vertical displacement varies from 20-120 feet (6-37 meters). The Spring Creek and Rock Creek Faults are downthrown to the northeast and their vertical displacement varies from 20-120 feet (6-37 meters). The Rush Creek Fault is downthrown to the southwest and splinters into two faults forming a small graben at its terminus. The Rush Creek Fault terminates against the Climax Fault which appears to splinter into the Silver Hollow and Ducks Head Faults. According to McKnight (1935) the Silver Hollow Fault has a maximum vertical displacement of approximately 200 feet (61 meters). The Caney Hollow Fault is downthrown to the southeast and has a maximum vertical displacement of 140 feet (43 meters). This area was heavily prospected for zinc in the late 1800's and early 1900's. Zinc mines and prospect pits are present throughout the quadrangle; however, locations are not shown within the National Park since they are

Cason Shale (Upper Ordovician) – The unit is poorly exposed and consists predominately of shale and siltstone with a 3 foot (1 meter) oolitic fossiliferous limestone observed at one location. The shale is silty and calcareous and contains polished phosphate nodules. The color is greenish-gray to black on fresh surfaces and weathers to greenish-tan to dark brownish-black. The siltstone is yellowish-green with laminations, cone-in-cone structures, and polished phosphate nodules. The limestone is lightgray and varies from micritic to coarsely-crystalline with oolites and crinoidal clasts. This unit was observed at two localities in the quadrangle: NE corner of Section 34 T17N R15W and the NW corner of Section 19 T16N. Thickness

ranges from 0-15 feet (0-6 meters).

ranges from 0-20 feet (0-6 meters).

Fernvale Limestone (Upper-Middle Ordovician) – A medium- to coarse-grained bioclastic limestone that is medium to thick-bedded. Color is light-pink to reddish white on fresh surfaces, but weathers dark-gray. Locally, contains barrel-shaped crinoids, brachiopod fragments, calcite vugs and pyrite. It weathers to rounded mosscovered boulders that are usually friable. It is predominantly observed in the southern portion of the quadrangle. It is unconformable with the underlying Plattin Limestone. Thickness ranges from 0-60 feet (0-18 meters).

Joint Frequency

Rose diagram of strike frequency of joints

recorded within the Cozahome quadrangle

## Description of Map Units

- Alluvium and terrace deposits (Quaternary) Unconsolidated deposits of clay, silt, sand and gravel including deposits on one or more terrace levels in small creeks and tributaries to the Buffalo River. Thickness is variable and reaches up to 20 feet (0-6 meters).
- Alluvium deposits (Quaternary) Unconsolidated deposits of clay, silt, sand and gravel within the active channel and sandy/gravel point bar deposits along Water Creek and the Buffalo River. Thickness is variable and reaches up to 20 feet (0-6 meters).
- Young terrace deposits (Quaternary) Unconsolidated deposits of primarily clay, silt and sand in youngest terrace approximately 20-60 feet above the river. The tops of the terraces are generally flat but can be hummocky and dissected by smaller streams. This terrace may correspond with the terrace portion of Turner and Hudson's (2010) young terrace. Thickness is variable and reaches up to 20
- Landslide deposits (Quaternary) Large blocks of St. Peter Sandstone scattered across a hummocky surface of unconsolidated material along Panther Creek. Thickness is
- Medial terrace deposits (Quaternary) Unconsolidated deposits of clay, silt and sand in higher (older) terraces approximately 40-80 feet above Water Creek and the Buffalo River. This terrace may correspond with Turner and Hudson's (2010) medial terrace. Thickness is variable and may reach up to 20 feet (0-6 meters).
- **Boone Formation (Mississippian Osagean) Consists** of interbedded thin- to medium-bedded limestones and anastomosing and bedded cherts. Limestones are light- to medium-gray on fresh surfaces, but weathers white. The cherts are various shades of white, gray, blue, brown and green. Springs and sinkholes are common. Quartz crystal mineralization is present locally, especially near faults. The Boone Formation is present on the tops of most ridges as regolith consisting of chert rubble and clay. Conformable with the underlying St. Joe Member and unconformable with the underlying Plattin Limestone or St. Peter Sandstone where the St. Joe is absent. Thickness ranges from approximately 40-360 feet (12-110 meters). St. Joe Limestone Member (Kinderhookian
- Osagean) Consists of thin-bedded, red to gray crinoidal and argillaceous limestones interbedded with very thin shaly intervals. Locally contains white crinoid fragments in a red fine-grained matrix. Manganese-rich beds (darker in color) are locally present in the lower portion of the unit. Thickness ranges from 0-40 feet (0-12 meters). Basal Sandstone – Fine to medium-grained, subangular to subrounded. Color is white to light-gray or tan in fresh surface and typically displays a "salt and pepper" or blotchy appearance. Phosphate grains range from fine sand to pebble size. Where present, it is unconformable with the underlying Silurian, Fernvale and Plattin Limestones and the St. Peter Sandstone. Thickness ranges from 0-15 feet. (0-5 meters).
- Silurian Limestone, undifferentiated (Silurian) The individual limestone units are generally less than 20 feet (6 meters) thick. They are grouped as one undifferentiated unit. The combined unit is unconformable with the underlying Ordovician rocks. Combined thickness ranges from 0-40 feet (0-12 meters).
- Lafferty Limestone Micritic to very fine crystalline limestone that breaks with a conchoidal fracture. Medium to thick bedded. Color varies from light-gray to gray to reddish-gray with red blebs throughout. The medium to thick limestone beds weather to form a rounded outcrop surface. Thickness ranges from 0-15 feet (0-6 St. Clair Limestone – Very coarsely-crystalline
- fossiliferous limestone that is massive bedded. The color is typically white with a pink hue but weathers to gray in outcrop. Contains pyrite framboids, and irregular vugs with colorless to white sparry calcite. Thickness ranges from 0-15 feet (0-6 meters). Brassfield Limestone – Coarse to very coarselycrystalline limestone that is thick to very thick to massive bedded. The color is mottled light-gray to dark red.

Contains crinoid ossicles, pyrite framboids, and irregular

vugs with colorless to white sparry calcite. Thickness

### Plattin Limestone (Middle Ordovician) - Consists of Op Plattin Limestone (Middle Ordovician) – Consists of thin- to thick-bedded, micritic to finely crystalline limestone that is light- to medium-gray on fresh surfaces, but weathers white- to light-gray. It is locally argillaceous and dolomitic with stylolites and chert nodules. Intervals of medium-gray fine- to medium-grained dolostone were observed at some localities. Springs are abundant at the Plattin/St. Peter contact. It is unconformable with the underlying St. Peter Sandstone. Thickness ranges from 0-

160 feet (0-49 meters).

- St. Peter Sandstone (Middle Ordovician) Consists of ine-grained medium- to massive- cross-bedded calcitecemented quartz arenite sandstone with locally interbedded blue-green to dark-gray shale. Quartz grains are sub-angular to sub-rounded. The sandstone is white to yellowish-brown on fresh surfaces, but weathers to gray Commonly case hardened but otherwise friable where the calcite cement has been leached out. The St. Peter contains the vertical trace fossil *Skolithos* which weathers in relief to resemble icicles. Locally, the unit can be subdivided into three parts. When present, the upper part of the unit forms a sandstone ledge up to 20 feet (6 meters) thick. The middle part is a poorly exposed slope-former comprised of thinbedded sandstone and light-green shale. Dark-gray silty shale approximately 1 foot (0.3 meter) thick was noted at two localities. The lower part is most persistant and forms a bluff up to 40 feet (12 meters) thick. Glades, sinkholes and cylindrical columns of sandstone referred to as "sandstone pipes" were observed at several localities. Unconformable with the underlying Everton Formation with up to 20 feet
- Everton Formation (Middle Ordovician) Consists primarily of interbedded dolostone, sandy dolostone, and sandstone with lesser amounts of bedded chert. Dolostones are thin- to medium-bedded and fine- to coarselycrystalline. They are medium-gray on fresh surfaces, but weathers light-gray. Sandstones are very thin- to mediumbedded and locally silica-cemented. Quartz grains are fine to coarse and sub-rounded to well-rounded. At most localities, a very thin- to medium-bedded limestone approximately 30 feet (9 meters) thick is present beneath the unconformity with the overlying St. Peter Sandstone. It

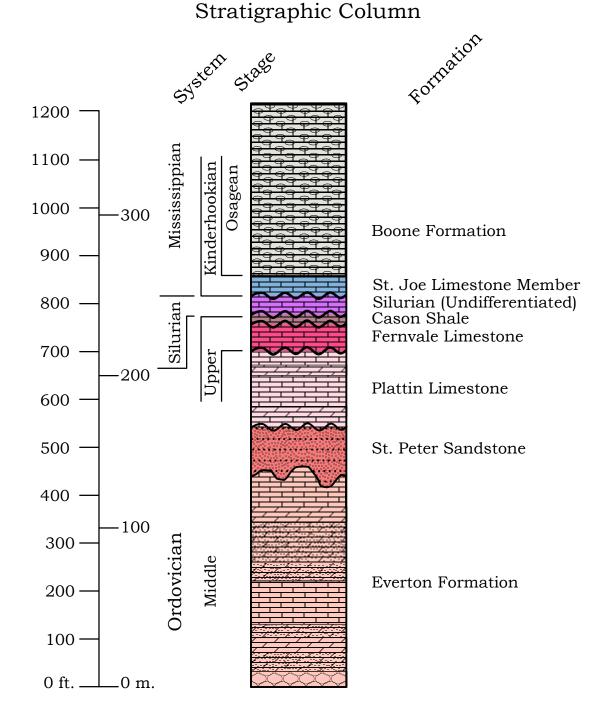
(6 meters) of relief on the undulating unconformable

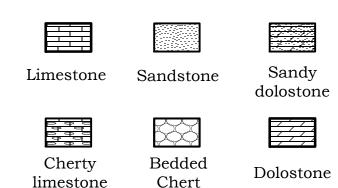
contact surface. Thickness ranges from 20-120 feet (6-37

limestone commonly contains stromatolites. It is referred to as the Jasper Limestone by Purdue and Miser (1916). Another interval of limestone and thin bedded chert is present in the lower part of the formation. Springs are common. The majority of documented zinc prospects are located in this unit. Approximately 60-460 feet (18-140

is light- to medium-gray on fresh surfaces but weathers

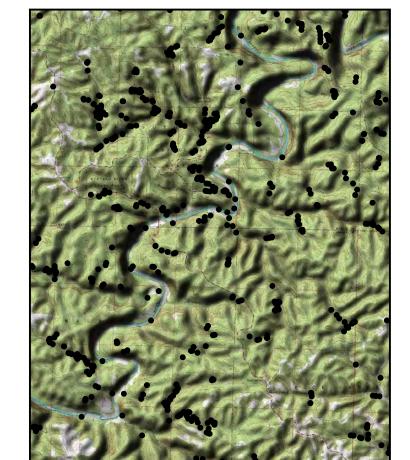
white to light-gray and is finely crystalline to micritic. This





Paleozoic Rocks within the quadrangle. (Maximum thickness of each unit shown)

unconformable surface



Map of the Cozahome quadrangle showing locations of data collection points.

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## Disclaimer

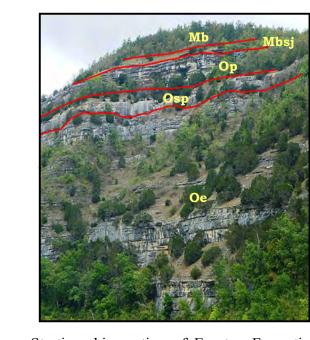
This map was prepared in a digital format using ArcGis 10, ArcMap software on computers at the Arkansas Geological Survey (AGS). The AGS does not guarantee the accuracy of this map when used on any other system or with any other software. As mapping continues and is refined, the data presented on this map may be updated. For the latest edition of this publication please contact our office.

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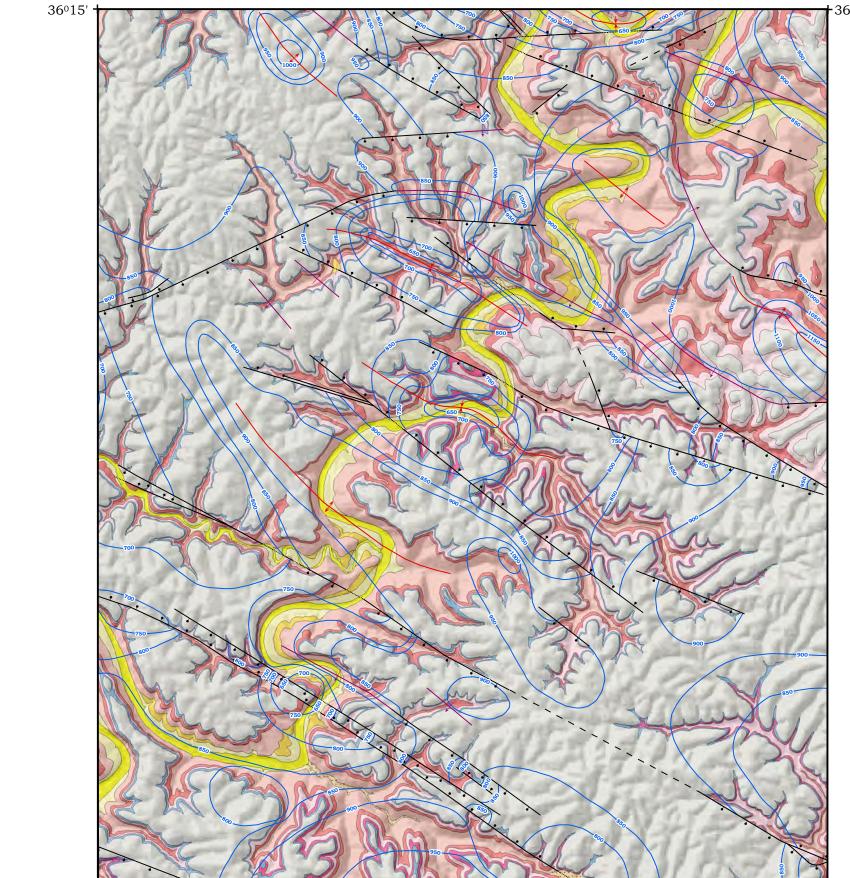
Digital compilation by Cody L. Traywick and Jerry W.



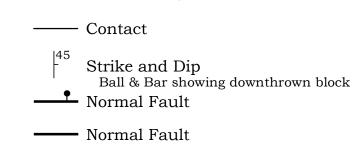
Stratigraphic section of Everton Formation (Oe) to Boone Formation (Mb) exposed along the Buffalo National River (BNR) at Ludlow Bluff. This bluff is one of the highest bluffs along the BNR at over 590 feet (180 meters) above river level.



Natural Arch in the St. Peter Sandstone (Osp). Note the contact between the St. Peter Sandstone (Osp) and Everton Formation (Oe) in the lower right-hand corner of the photo.



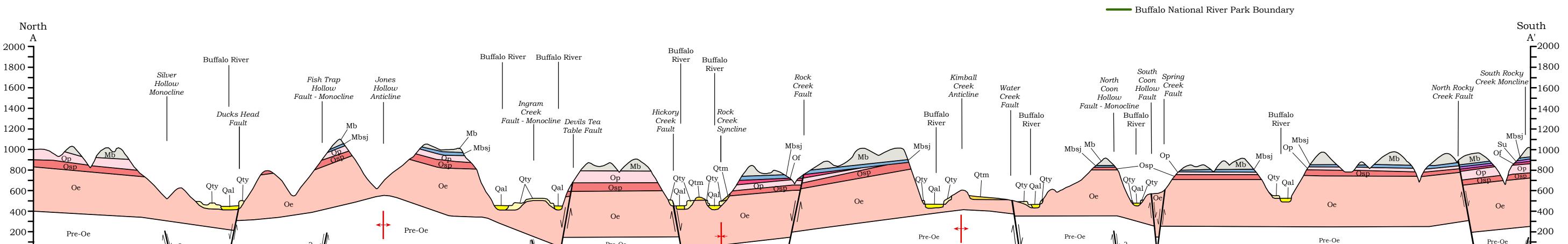
Map of the Cozahome quadrangle showing location of major structures and generalized structural contours on the base of the Boone Formation. Contour interval: 50 Feet (Adapted from McKnight, 1935).



...... Concealed Fault Inferred Fault Anticline Axis

considered sensitive park resources.

- Syncline Axis Monocline Axis × Mine, Abandoned
- \* Prospect, Abandoned



MOUNTAIN VIEW 39 MI.

ROAD CLASSIFICATION

Medium-duty..... Light-duty.....

Unimproved dirt -----

State Route

COZAHOME, ARK.

N3600 - W9230/7.5

1966

AMS 7456 II SE - SERIES V884

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