

**GEOLOGIC FLOAT GUIDE ON THE UPPER
BUFFALO NATIONAL RIVER**

by

John David McFarland, III



ARKANSAS GEOLOGICAL COMMISSION
Norman F. Williams, Director
1979

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Ponca Low-water Bridge to Camp Orr

Boy Scout Camp

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INTRODUCTION

Proclaimed as one of the finest free flowing rivers in America, the Buffalo National River rises in western Newton County, Arkansas and flows in a sinuous path easterly for about 150 miles. Draining a large portion of the northern Boston Mountains and the southern Springfield Plateau the Buffalo is deeply entrenched into the flat lying Paleozoic rocks of north central Arkansas. Canoeists are drawn to the Buffalo by the clear waters, thrilling rapids, and magnificent bluffs. The stretch of river between Ponca low-water bridge (Highway 74) and Camp Orr Boy Scout Camp is dominated by the highest bluffs between the Appalachian and Rocky Mountains. It is to these bluffs and the rocks that are exposed thereon that this geologic float guide is dedicated.

GEOLOGY

The bed of the river along this geo-float trip is incised in Ordovician age rocks of the Everton or subjacent Powell Formation except when passing through the Jim Bluff Graben where the Lower Mississippian age St. Joe Limestone occurs at river level for short stretches.

The oldest unit to be found along the upper Buffalo River is the lower Ordovician Powell Dolomite. The Powell is a light gray, fine grained, argillaceous dolomite with some layers of concentrically banded nodular chert. The best exposed outcrops of Powell are found in Hemmed-in-Hollow.

Majestic bluffs cut from alternating beds of sandstone, limestone, and dolomite of the middle Ordovician Everton Formation dominate an upper Buffalo River float trip experience. The Everton is about 350 feet thick in this area and has been divided into several members by various workers. The most prominent of these members along the upper Buffalo is the 100 foot thick Newton Sandstone of the middle Everton. This sandstone, like other sandstones in the Everton, is a fine to coarse grained, well rounded, frosted, often

friable, occasionally well sorted quartz arenite. Cementation of the Everton sandstones is accomplished by dolomitic or calcitic carbonates or interlocking overgrowths of silica. In some beds the calcitic cement forms a "poikiloblastic" texture.

The Everton above and below the Newton Sandstone Member consists of alternating beds of dolomite, limestone, and sandstone, none of which persist for any great distance laterally. The limestones consist of calcilutites and calcarenites, with variable amounts of dolomite. Quartz sand of the type found in the Everton sandstones often occurs in many limestone beds as scattered grains, lenses, pods, and thin sometimes disrupted stringers. Allochemical constituents of the calcarenites include pellets, intraclasts, oolites, ostracods, and rarely other invertebrate fossils, all of which may occur together or separately within any distinct bed. Everton dolomites are very fine to coarsely crystalline and include variable amounts of pellets, intraclasts, oolites, ostracods, and gastropods as allochems. Quartz sand is commonly found as scattered grains gradational to very sandy dolomite.

A few conglomerates, breccias, and cherts occur at various discontinuous horizons in the Everton throughout the area. The nature of the carbonates and sands of the Everton in this area allows a veneer of travertine or sandy travertine to form across much outcrop area obscuring both the bedding and lithology.

The top of the Everton along the upper Buffalo River is represented by the Jasper Member. The Jasper can be divided into two lithologic units, a lower sandstone or limy sandstone and an upper limestone or sandy limestone with subordinate dolomite. Along the route of this geo-float trip the upper limestone facies is missing. Whether this is due to post Everton erosion, nondeposition, or facies change is unknown at this time.

At one place on Big Bluff, just below the "Goat

Trail", a limestone lens of uncertain stratigraphic assignment is exposed overlying the Jasper sandstone. The lower beds of this limestone are similar to the younger middle Ordovician age Plattin Limestone, a sublithographic to finely crystalline limestone with a few scattered quartz grains or thin sandstone stringers. This is in contrast with the upper limestone beds which are coarsely crystalline, fossiliferous calcarenites and calcirudites and resemble the upper Ordovician Fernvale Limestone.

Unconformably overlying the Everton Formation is a 4 to 6 foot thick, clean, fine to medium grained, rounded, friable quartz arenite of Devonian or Basal Mississippian age. The name Sylamore Sandstone Member of the Chattanooga Shale, a Devonian unit, has often been applied to this sandstone but some workers have demonstrated a basal Mississippian sandstone of similar characteristics. A conglomerate occurs at the base of this unit and phosphatic nodules can be found at the top. Above this sandstone the unquestioned Mississippian age (Kinderhookian and Osagean) St. Joe Limestone is developed. The St. Joe in this area is a 50 to 60 foot thick interval of very fine to coarse grained, fossiliferous, tabular bedded, argillaceous calcarenite and calcareous shale. Occasional bedded and/or nodular chert has been observed in some outcrops of the St. Joe. Beds of brick red limestone and shale distinguish the St. Joe throughout this region.

The Mississippian age Boone Formation conformably overlies the St. Joe. The Boone is composed of cherty limestones with chert dominating much of the sequence. Along this stretch of the Buffalo River the Boone is around 400 feet thick but it thins to less than 250 feet atop the Sneeds Creek Dome.

Capping the hills surrounding the Buffalo River and generally unseen from the River are strata of Mississippian and Pennsylvanian age. Overlying the Boone, these strata include (in ascending order): the Batesville Sandstone, the Fayetteville Shale, and the Pitkin Limestone of Mississippian age; and, the Hale, Bloyd, and Atoka Formations of Pennsylvanian age.

STRUCTURE AND MINERALIZATION

Most float trips on the upper Buffalo begin near the town of Ponca, Arkansas. Lead and zinc have been sporadically mined around the Ponca area from Civil War days into the 1950's. Over 4000 tons of galena, zinc carbonate, and zinc silicate concentrates have been produced from deposits in the Boone and Batesville Formations. The mineralized deposits in the Ponca District occur along the Ponca lineament which is thought to be the surface expression of a Pennsylvanian age shear fracture related to the Ouachita orogeny effecting nearly all of the Paleozoic rocks. The Ponca lineament strikes N. 30° E. and can be traced on high altitude photography and Landsat satellite imagery for over 40 miles -- from the Arkansas River Valley to near Harrison, Arkansas. Small faults associated with this lineament have been noted in and around many of the

mines of this area.

Centered about 3.5 miles north northeast of Ponca (Sec. 6, T. 16 N., R. 22 W.) is the Sneeds Creek Dome, a feature of unknown origin covering 12 to 15 square miles. Field data supporting its existence are differences in elevation of stratigraphic horizons, thinning of recognizable intervals, and sparse strike and dip data across the structure.

A pair of grabens with their associated faults strike east southeast from the Sneeds Creek Dome. The displacement varies along the grabens, but in general is between 200 and 300 feet. The traces of the bordering faults cross the river at various places between mile 6 and 10.

GEO-FLOAT GUIDE

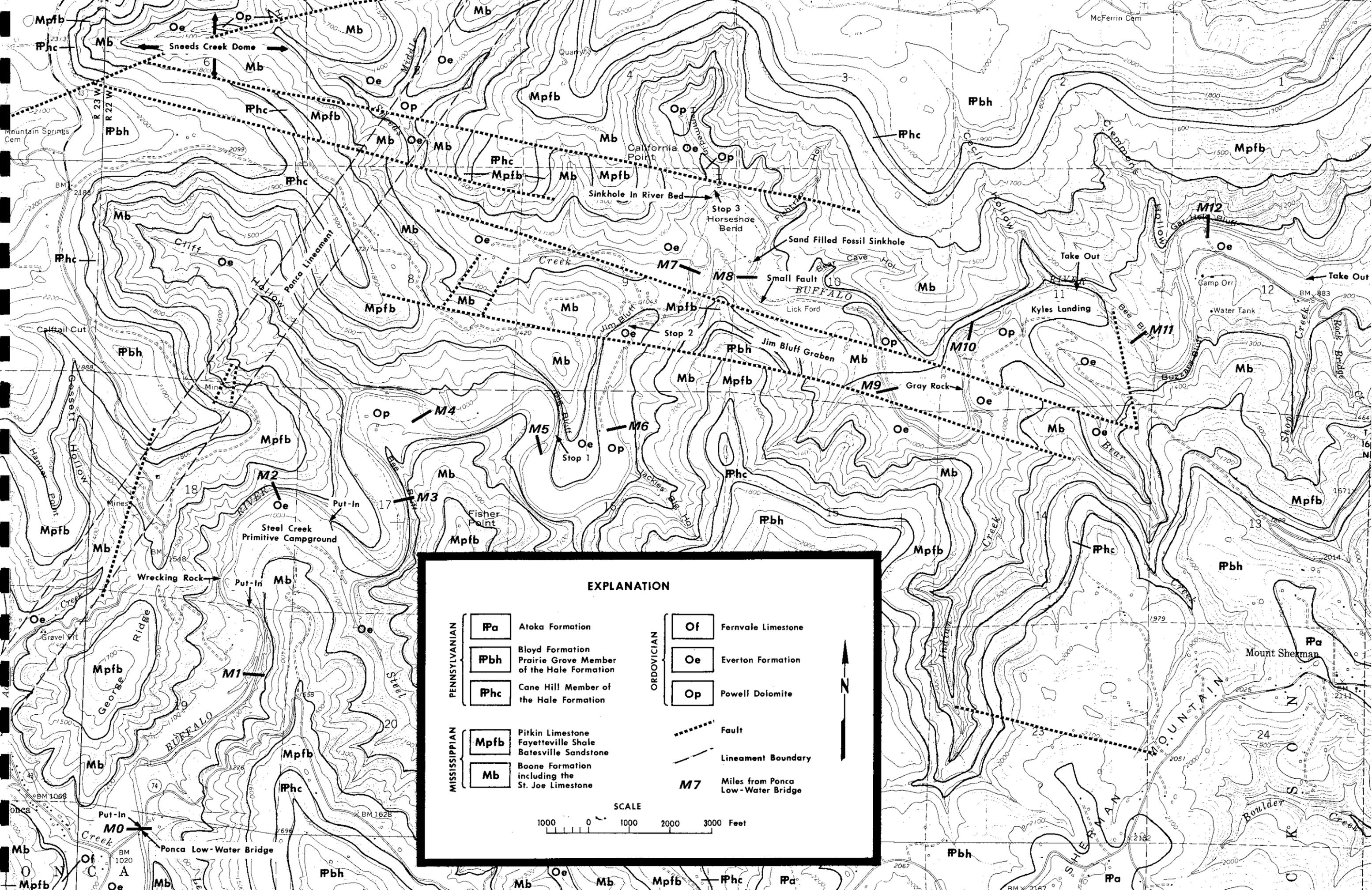
The starting point or put-in for this geo-float guide is the low-water bridge on Arkansas State Highway 74, southeast of Ponca, Arkansas, locally called the Ponca Low-water Bridge. As logged this float is just over 12.5 miles long and ends at the landing at Camp Orr Boy Scout Camp. For a slightly shorter trip (9 miles) you can put-in at Steel Creek and take-out at Kyle's Landing. The Ponca Low-water Bridge is where safe water levels can be determined. A 12 to 18 inch air space under the bridge is recommended. The river drops about 12 feet per mile along the route of this guide. Tricky turns, large boulders, and the frequent shoals challenge the canoeist throughout this portion of the river.

Mileage	Description
0.0	Ponca Low-water Bridge. The river bed and bluffs are in the Everton Formation to Mile 2.3.
1.25	Upper Steel Creek Put-in.
1.5	Wrecking Rock! - This boulder has caused many a canoeist to take an unscheduled swim.
1.6	Steel Creek Primitive Campground.
2.3	Lower Steel Creek Put-in -- this also marks the approximate location where the river is reported to cut into the Powell Dolomite. River gravels cover most outcrops of Powell in the river bed.
4.1	Big Bluff may be seen at the end of this long pool. Big Bluff is the highest bluff on the Buffalo and stands over 500 feet high. As you approach the bluff, the massive Newton Sandstone Member of the Everton Formation forms the lower bluff seen just above the lowest tree tops. The base of the vegetation break across the middle of the bluff marks the approximate top of the Newton. The reentrant observed in the upper half of Big Bluff is formed in the St. Joe

Mileage	Description	Mileage	Description
	Limestone. Red limestones and shales in the St. Joe are visible on the bluff from this approach. The base of the reentrant marks the Goat Trail, a path leading across the bluff face down to the river.		level and in the river bed to Mile 6.75. Weathering has obscured the contact with the overlying lithologically similar sandstone of basal Mississippian(?) age. The St. Joe Limestone is well exposed here and makes up most of the bluff. A cable swing is provided for your enjoyment.
5.0	: STOP 1. Big Bluff. Beach canoes at south end of Big Bluff, in the slough just past the exit shoal. Climb across the talus slope to the base of the bluff and work your way around and up the south end to the Goat Trail. The Goat Trail is not well defined through the woods until you climb up to the approximate level of the top of the Newton Sandstone. Exposed at the base of the bluff are about 60 feet of lower Everton dolomite, sandstone, and limestone. The base of the 110 foot thick Newton Sandstone is unconformable here and exhibits some relief. Small solution cavities and shelters occur at the base of the Newton due to removal of the carbonate cement of the sands. In one shelter near the south end of the bluff so called "cave coral" has formed on the roof. Overlying the Newton is about 100 feet of Everton sandstone, dolomite, and limestone, the upper 20 feet or so of sandstone representing the Jasper Member. The Goat Trail goes across the bluff face in a reentrant in the basal St. Joe Limestone and generally on the 4 to 6 foot thick basal Mississippian(?) sandstone. About midway across the bluff face a slump structure containing Plattin and Fernvale Limestones can be found under the Goat Trail. Three members of the St. Joe are recognized here overlying the basal Mississippian(?) sandstone: 9 feet of the lowermost Compton Member, a thin to medium bedded limestone; 9 feet of the Northview Member, a sequence of limestone and shale; and 35 feet of the upper Pierson Member, a medium to thick bedded limestone. The top of the St. Joe is accessible off the north end of the bluff where the Goat Trail leads to a dirt road (now closed). The cherty limestone of the Boone Formation caps the bluff. The Goat Trail across Big Bluff is about 340 feet above the river and offers a splendid view of the Buffalo National River. Return to canoes by the same trail.	6.75	: River bed in St. Joe Limestone to Mile 6.9.
		6.9	: Crossing normal fault (downthrown to the south) that marks the north boundary of the Jim Bluff Graben. River bed in Everton to Mile 8.5.
		7.0	: Sneeds Creek enters from left.
		7.4	: STOP 3. Hemmed-in Hollow. A few yards upstream from the mouth of Hemmed-in Hollow a small collapse structure or sink hole is developed in the river bed outcrops of Everton. Beach canoes on left bank. Hike up trail leading into Hemmed-in Hollow to the waterfall (about 0.5 mile). A normal fault (downthrown to the south) is crossed a short way into the hollow. Outcrops of Powell Dolomite occur along the streams that the trail crosses and follows. As you approach the upper portions of the hollow chert beds in the Powell are exposed in the main stream branch. The waterfall at the head of the hollow is about 200 feet high and is reported to be the highest waterfall between the Appalachian and Rocky Mountains. The basal 50 or 60 feet of this cliff face is Powell. The Everton overlies the Powell and outcrops to the top of the cliff. The waterfall breaks in the Newton Sandstone Member. A trail leads off to the east from near the base of the waterfall and curls back across the cliff and behind the waterfall. This trail across the cliff face is in the Powell Dolomite a few feet below the horizon of the Powell-Everton contact. This contact is marked by a basal Everton conglomeratic sandstone overlying the argillaceous dolomite of the Powell. Return to river and canoes.
		7.9	: A sand-filled fossil sink hole in the Everton is well exposed in a low bluff, on the right, just above the exit shoal for this pool.
		8.1	: A small normal fault can be seen on the right as you enter this pool. This fault may be associated with the Jim Bluff Graben which passes just south of this location.
		8.5	: River bed in Powell Dolomite to Mile 8.8.
		8.8	: River crossing normal fault (downthrown to the south) and into Jim Bluff Graben. St. Joe
5.8	: Jackies Big Hollow on right.		
6.5	: STOP 2. Jim Bluff. Beach canoes at upper end of Jim Bluff. This bluff is within a graben, referred to in this guide as the Jim Bluff Graben. The normal fault (downthrown to the north) that marks the south boundary of this graben strikes generally east-west and truncates the upstream end of this bluff. The Jasper Member of the Everton is at water's		

Mileage	Description	Mileage	Description
	Limestone in river bed to Mile 8.9.		side shoal. More people get tumped out of their canoes at this point than at any other place on the upper Buffalo. Gray Rock marks the approximate location of the normal fault (downthrown to the south) which borders the north side of the Jim Bluff Graben. The river bed is in Powell Dolomite to Mile 10.5.
8.9 :	River bed in Everton to Mile 9.75.		
9.1 :	Crossing normal fault (downthrown to the north) and out of Jim Bluff Graben.		
9.6 :	Gray rock shoals just ahead! Indian Creek enters from right. Indian Creek has cut a deep canyon into Sherman Mountain here and is well worth the hike (climb) to the head waters. A few small caves, a large spring, several waterfalls and a natural bridge are among the points of interest. This is not an easy hike so if you plan to explore this canyon allow plenty of time.	10.4 :	Kyles Landing - A primitive campground for floaters.
9.75:	Gray Rock! This rock juts out into the river from the left and is approached down a left	10.5 :	River bed in Everton to end of float.
		11.9 :	Small collapse structure in Everton on Gar Hole Bluff. In summer this structure is partially hidden by trees. Camp Orr Boy Scout Camp on right.
		12.5 :	Camp Orr Landing and end of geo-float.

NOTES

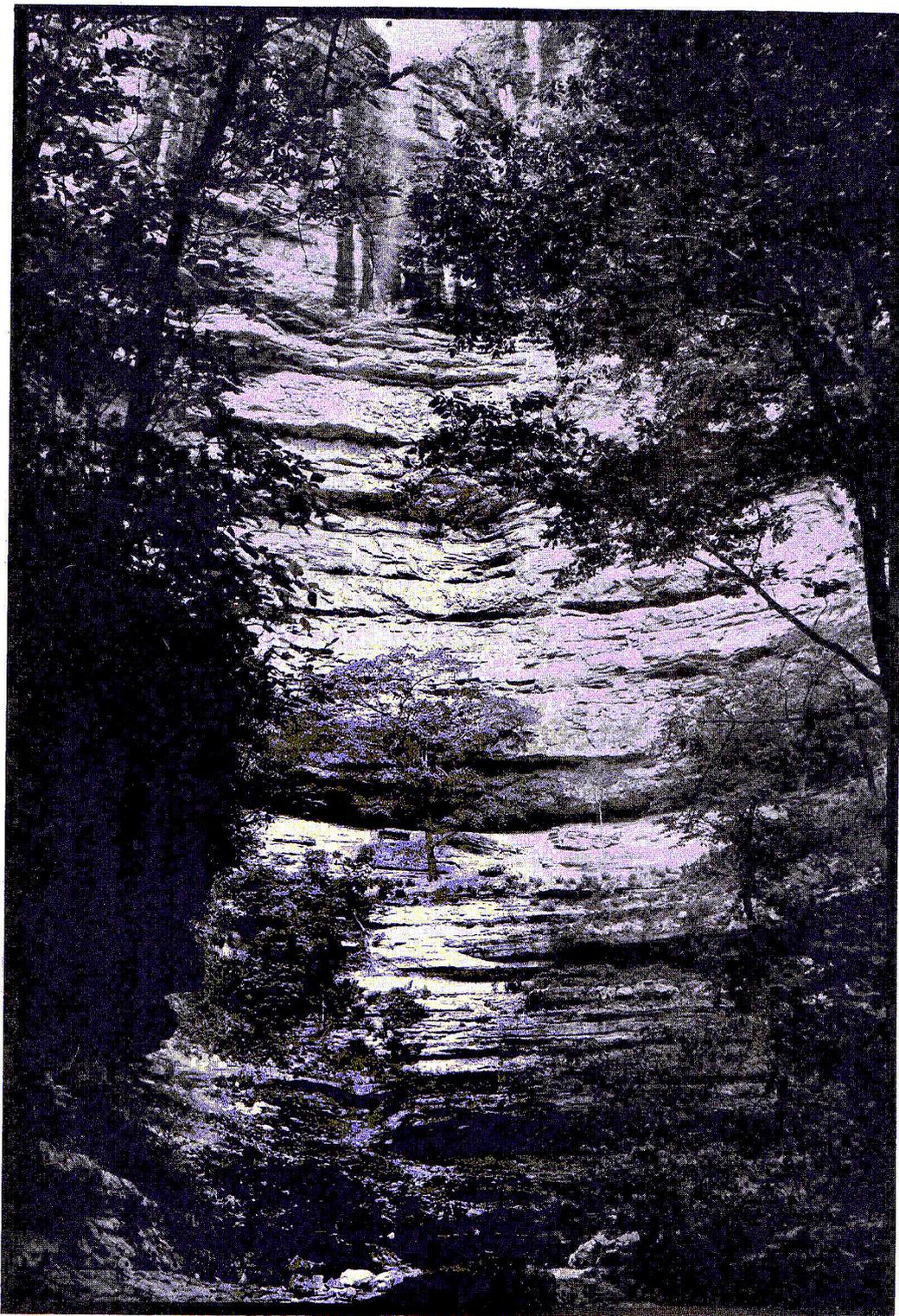


EXPLANATION

PENNSYLVANIAN	Pa	Atoka Formation	ORDOVICIAN	Of	Fernvale Limestone
	Pbh	Boyd Formation Prairie Grove Member of the Hale Formation		Oe	Everton Formation
	Phc	Cane Hill Member of the Hale Formation		Op	Powell Dolomite
MISSISSIPPIAN	Mpfb	Pitkin Limestone Fayetteville Shale Batesville Sandstone	Fault		
	Mb	Boone Formation including the St. Joe Limestone	Lineament Boundary		
			Miles from Ponca Low-Water Bridge		

SCALE

1000 0 1000 2000 3000 Feet



Hemmed-In Hollow