

FLORIDA CAVERNS STATE PARK

A NATURE-MADE GEOLOGIC WONDERLAND



**Florida Department
of
Natural Resources**

This leaflet is a revision of a pamphlet written in 1949 by
Dr. Robert O. Vernon, of the Florida Geological Survey.



Prepared by the

FLORIDA BUREAU OF GEOLOGY
DIVISION OF RESOURCE MANAGEMENT
FLORIDA DEPARTMENT OF NATURAL RESOURCES

1982

This public document was promulgated at a total cost of \$256.00 or a per copy
cost of \$.13 for the purpose of disseminating geologic data.

FLORIDA CAVERNS STATE PARK

A NATURE-MADE GEOLOGIC WONDERLAND

by

Walter Schmidt

Florida is truly a product of the sea, since all the rocks composing its land were formed directly on the ocean bottoms or by streams emptying along the shores. From the record of these rocks we know that Florida has been alternately above and below the sea many times in the geologic past. In fact, the rocks visible in the park area and in the caves at Florida Caverns, near Marianna, Florida, were formed from the hard shells of animals that lived in one of these seas. As the animals died, their shells accumulated on the sea bottoms, where they were covered by other shells and hardened into thick sequences of limestone.

These shells, called "fossils," are remains representing cemeteries of the past. Similar limestone has also formed in areas that are today many miles removed from the present seas, as in Iowa and other middle western states, telling us where seas have been in the past. Along much of Florida's coastal marine areas at present, shells are accumulating and forming limestone today.

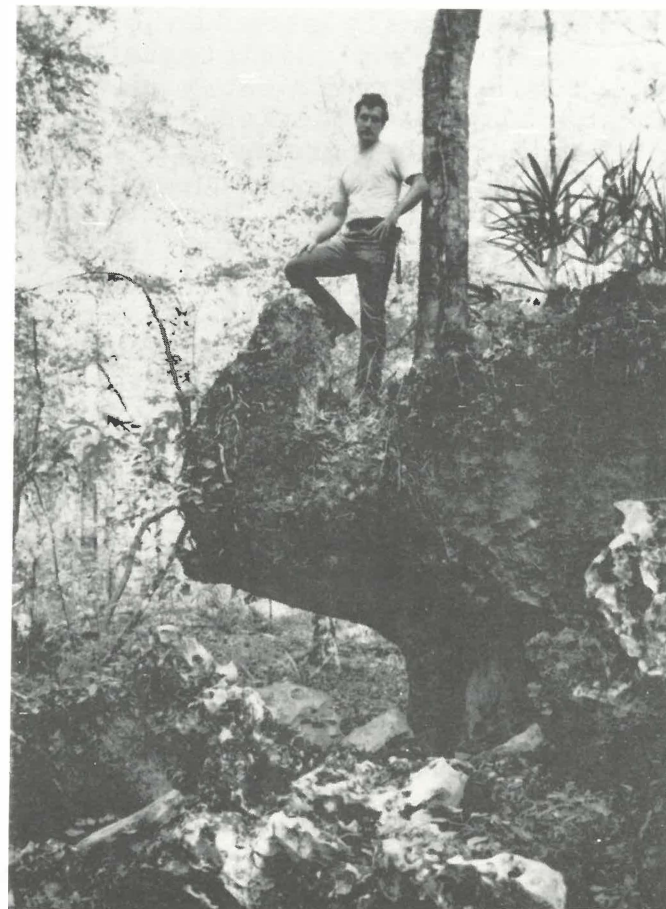
How do we know that these limestones were formed in the sea? As you go through

the caves at Florida Caverns, look closely at the walls and you will be able to find the shells of scallops and other clams. We know these animals lived only in shallow seas. The most common shells that you will notice will be many small, coiled, flat shells about the size of barley seed and flat thin disks about the size of dimes and quarters. The animals that formed these shells are known as Foraminifera and have the tongue twisting names of Operculinoides and Lepidocyclina. These particular animals are extinct and are known only from rocks of the geologic age from about 38 to 54 million years ago. From their association with other shells they are known to have lived in shallow saltwater seas. By means of these fossils the geologist is able to recognize this particular limestone, from wherever it

may be found, which may be an outcrop or rock samples from a well drilled many feet below the ground surface, for these small shells are recognizable even when the limestone has been broken into fine fragments.

The limestone in which the caves of Florida Caverns were carved is known, from geologic studies made throughout the state, to have been raised from the sea by land movements after being formed, and then to have been extensively eroded. It was again submerged under the sea and other limestones were deposited over the eroded surface. These limestones subsequently were raised out of the sea to be eroded. Over this second eroded surface a deltaic deposit of sand, clay and gravel was laid down by streams that emptied into the Gulf of Mexico.

The limestone that you will see in the caves is known as the Ocala Group limestone, named from deposits near Ocala, Florida. Near Florida Caverns, limestones named the



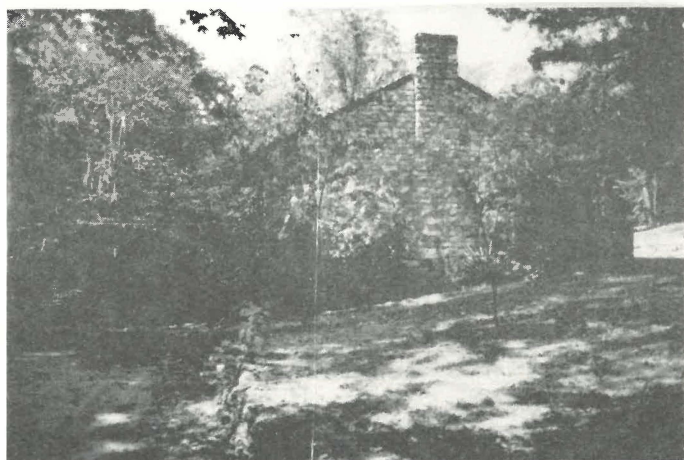
The Ocala Group limestone is exposed throughout the park.

Suwannee Limestone and the Marianna Limestone overlie the Ocala Group. These limestones were named for deposits recognized along the Suwannee River and at Marianna, Florida. The sand, clay, and gravel overlying all of these limestones are not named but are believed to be Miocene to Recent in age, from 26 million years ago to present. Part of this period is popularly known as the "ice age."

Since emerging from the sea for the last time, this part of Florida has been

constantly undergoing changes. The rocks have been continuously attacked by elements of the weather, and disintegrated where exposed. Surface streams carry away much of these products of weathering, but the work of water under the ground is the major factor in the creation of these caves and the deposits in them. This underground water, moving through the pores in the limestone, has been and is now wearing away portions of the land. These water channels are isolated along fractures, bedding planes and other structural weaknesses, or in poorly consolidated rock. The water dissolves the limestone and carries it out into surface streams and on to the sea. The amount of this material being carried away is illustrated at Silver Springs, one of the State's larger springs, where each day about

541 tons of dissolved rock is carried away in water. When it is realized that this is only one of thousands of springs in Florida, it is easy to understand the tremendous amount of rock that is being dissolved each day from beneath the ground, and just how cavernous the rocks in Florida's subsurface must be.

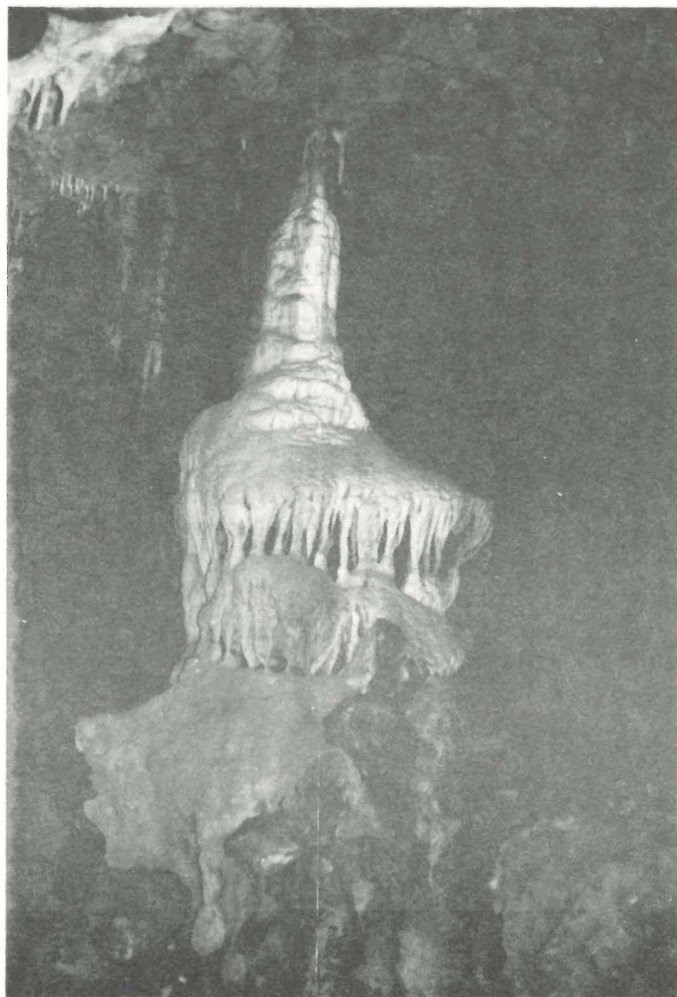


The administration building is built of the native limestone.

Solution of Limestone

The rocks in which the caves of the Florida Caverns State Park were formed are limestone. This rock is composed principally of the mineral calcite (calcium carbonate). Limestone, as a rule, is jointed vertically and bedded horizontally. The permeability along these joints and bedding planes provides relatively easy avenues of travel for water. The primary source of all of Florida's ground water is rain. As rain falls, it combines with carbon dioxide gas to form carbonic acid. When the rain reaches the ground, humic acids from rotting vegetation are added. This acidic water is a common natural solvent of limestone, and, as it soaks into the ground and moves through the limestone horizontally along bedding planes, it dissolves some of the rock. Thus, our cave systems generally are developed horizontally and parallel to the bedding planes. One system of caves may lie above another, and they may be connected by vertical tubes and rooms. The ceilings of caverns may eventually reach so near to the surface that they can no longer support the weight of the surface deposits (largely sand in Florida), whereupon collapse occurs into the cavern, forming a sinkhole at the surface. A large number of Florida's natural lakes, depressions and ponds have been formed in this way. These features range from small pits, a few feet in diameter to large depressions several miles wide. Many are perfectly round, others are highly irregular. Some are coneshaped with rocky bottoms, some have broadly developed flat bottoms and are known as prairies. Still others are vertical tubes, only a few inches in diameter

in some cases, that extend as much as one hundred feet down into the limestones. These are called "natural wells."



The rock formations take many shapes. Here a column appears as a wedding cake in the well-lighted underground trail.

Land Movements in Florida

Have you ever thought how it is possible to walk through the dry caves of the Florida Caverns Park when, in fact, the caves were formed under water? That is, they were formed beneath the land surface where all the pore spaces and voids are either occasionally or always filled with water. We mentioned that this area has alternately been beneath sea level and then high and dry. We know that where rocks which were formed under marine waters are exposed on the land surface today it is obvious that the land has been raised out of the sea, or the sea has been lowered.

Let's examine how sea level may fluctuate. Everyone has heard that ice covers the North and South poles of the earth, but few people realize that, if much of this ice melted, the level of today's seas would be much higher. Fossil evidence preserved within the rocks tells geologists that the sea once covered what is now the entire state of Florida. Geologists believe the major cause of these sealevel changes in the Florida area is due to glacial and interglacial fluctuations of worldwide temperature. Considering the subtropical climate of Florida, isn't it peculiar that ice had so much to do in shaping our land surface?

As a matter of record, all of the surficial deposits making up most of the land surface of Florida were created and shaped during the geologic past (one to ten million years ago) when ice piled up on the poles and moved down over lower latitudes in the form of glaciers. The water forming these glaciers came from ocean basins, which subsequently lowered their water levels as

much as three to four hundred feet. As a result of these lowered sea levels, much of the continental shelves bordering the Gulf and Atlantic were dry land, and streams striving to empty into the lowered seas cut

their valleys much deeper. Ground water circulated more rapidly and rocks through which it passed were dissolved faster. Later, as the polar ice melted, the sea level rose to encroach upon the flanks of the continent; streams became sluggish and deposited sediment in their valleys to make their floodplains. The sands, clay, and gravel that make up the surface of most of Florida represent former stream and river deposits, and what were once the bottoms of the Gulf and Atlantic, now raised out of those seas.

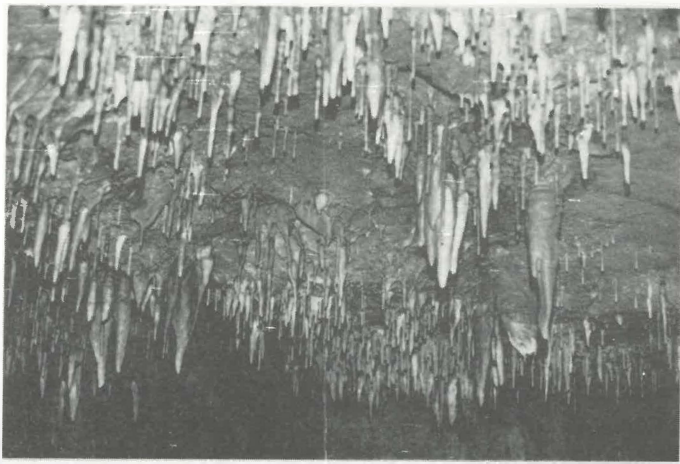
Cave Deposits

In the preceding discussion we have examined how caves are formed, largely in rocks saturated with water, and how, by land movements and changes of sea level, the limestones in which the caves formed can be moved above permanent water levels and exposed to air. Now the process reverses--it becomes possible to deposit rock in the caves. As you go through the caves you will notice that the walls are wet and that water is oozing out of the pores of the rock. Small drops of water emerging from the cave walls evaporate and the calcite and other rock minerals that the water held in solution are deposited along the walls. Where these drops cascade along the walls a continuous elongated ridge is deposited. If

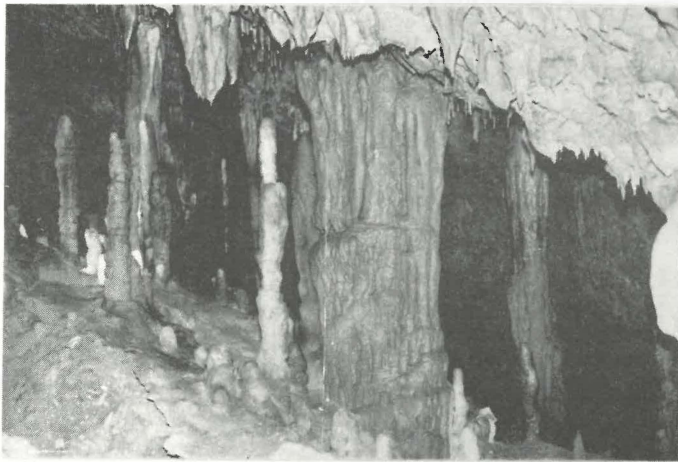
the water oozes out in an extremely fine coating of water, the entire ceiling, walls, and floor may be paved with calcite.

Where water drops tend to collect at the same spot on the cave ceiling, a thin strawlike deposit may be formed, after which any remaining water may drop to the cave floor where more calcite is deposited. Continuous dripping results in paired deposits extending down from the ceiling and up from the floor. The deposit on the floor, called a stalagmite, is commonly thicker and tapers much like an icicle. Those hanging from the ceiling are called stalactites. Where these two deposits are joined they are known as a column.

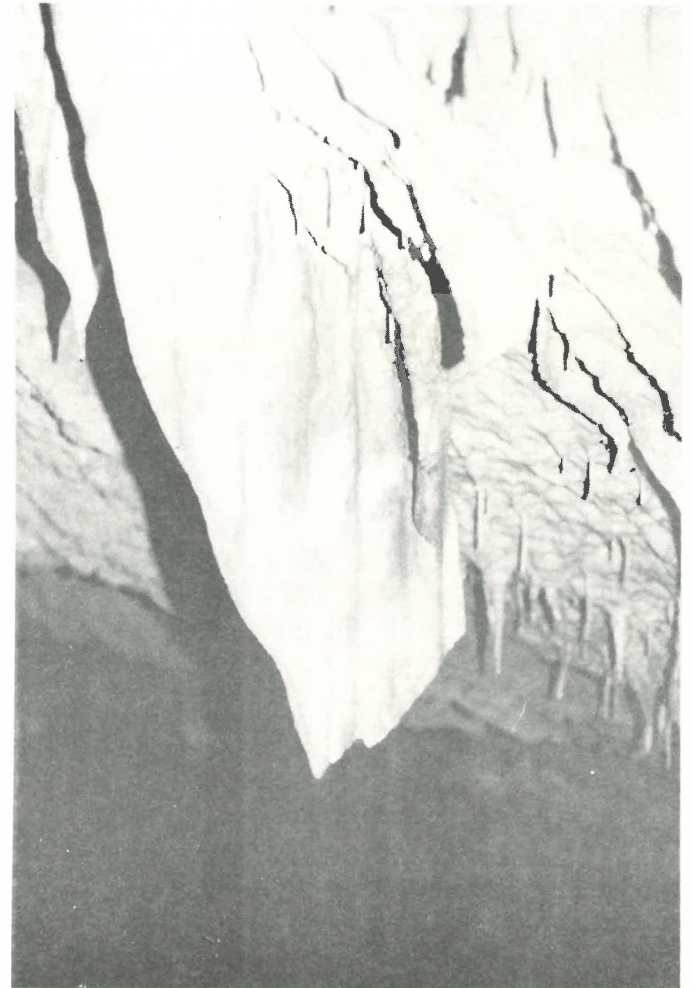
These cave formations are mostly composed of the mineral calcite, which forms all limestone. Some of the deposits are crystalline, and it is remarkable that as calcite crystallizes from the many individual drops of water it is arranged always in a particular pattern to form crystals. These crystal faces reflect light and form the many unusual and beautiful arrangements which you will see in a visit to the caves.



Thin straw-like stalactites can be seen on the cave ceiling.



In time, with the addition of more and more calcite, columns can become quite thick.



When water seeps from a crack, the calcite left behind may form a small ridge. Subsequent seepage and evaporation adds additional deposits, forming a banded, sheet-like formation.

Early History

Since early time, Florida Caverns has created interest. They were first mentioned in writings by Friar Barreda, who was with the first overland expedition made by the Spaniards to Pensacola Bay. The following paragraph is a translation of the Friar's own words, written 289 years ago:

"On June 12 (1693) we continued northwest and after we had journeyed a little more than three leagues. . . we reached an abandoned village of the Choctaw tribe called San Nicholas where I came to preach the holy gospel in the year 1674. Here we spent the night in the hollow of such a beautiful and unusual rock that I can state positively that more than 200 men could be lodged most comfortably in it. Inside, there is a brook which gushes from the living rock."

Experts, who know how to read stories told in the designs on Indian pottery, state that the caves were known to the Indians of this section long before the coming of the Spaniards. There is considerable evidence that Indians, even prior to 1693, had been in the habit of using Florida Caverns and caves in the vicinity for shelter during their hunting trips into the region and for refuge from their enemies. In some of the

smaller, dry caves there have been found small, broken pieces of Indian pottery. According to archeologists, all of the sherds so far discovered are of a post-Columbian type (prior to approximately 1500 AD). Ashes from fires, dead for many years, flint arrowheads, and animal bones have also been found in the caves.

Several times in history, Florida Caverns - a nature-made shelter - was used as a refuge from armed forces. During Andrew Jackson's punitive expedition against the Indians in 1818, a large band of Indians escaped from his soldiers by concealing themselves within the underground caves. Again, during the Civil War, an outfit of Union Soldiers en route to Pensacola was resisted by a home guard unit from Marianna, composed of men too young or too old to fight in the armies of the Confederacy. While the battle was raging, women, children and slaves took refuge in Florida Caverns.

A clear spring, rising out of the limestone, sends its lovely azure stream down through the park over a mile before it enters the Chipola River. The Chipola Natural Bridge, located in the park, is a fourth of a mile long and has been restored to its original interesting geological condition with the removal of logs and lumber which had jammed into it in bygone days when the river was used to float them down to a mill.

Open the year round, Florida Caverns State Park is comparable in interest to Carlsbad Caverns, New Mexico, Mammoth Caves, Kentucky, and Luray Caverns, Virginia.

WHAT TO LOOK FOR

Some geologic features you will see during your tour of Florida Caverns State Park (see map, page 17).

1. Caverns Entrance

Inside you will see cave formations which include stalactites, stalagmites, sodastraws, columns, rimstone, flowstone, and draperies. All are composed of the mineral calcite, with colors ranging from white to tannish-orange to black. The colors are the result of impurities in the groundwater, such as iron, and from the cave being exposed to air over extended periods of time.

2. Tunnel Cave

Here you will see a cave which has been eroded out of the limestone. The acidic groundwater has dissolved away the limestone by following the horizontal bedding of the rock. In addition, there is a vertical joint or fracture which runs the length of the cave. This can be seen in the ceiling and at both ends of the tunnel. The intersection of this fracture with a weakly cemented horizontal layer probably formed a conduit for ground water which was the cause of the cave being formed here.

3. Flood Plain River Bluffs

In this area the trail follows the steep limestone bluffs along the Chipola River floodplain. These bluffs were formed by floodwaters eroding the bank of the river.

4. Exposed Limestone

All along the nature trails throughout the park limestone is exposed as weathered boulders and in original position. This is the Ocala Group limestone from the Upper Eocene Series (deposited approximately 40 million years

ago). If one looks closely at the fresh or weathered outcrops, numerous fossils of marine organisms can be seen.

5. Natural Cave Openings

There are numerous natural cave entrances visible along the trails. Some of these are open to experienced spelunkers (cave explorers) with permission from the Florida Division of Recreation and Parks.

6. Sinkholes

Numerous small sinkholes are present throughout the park. Sinkholes result when a cavern roof can no longer support the weight of the overlying sand and rock. The "roof" and surface soil collapse into the underground cavern. Collapses are often triggered by fluctuations of groundwater levels.

7. Natural Bridge

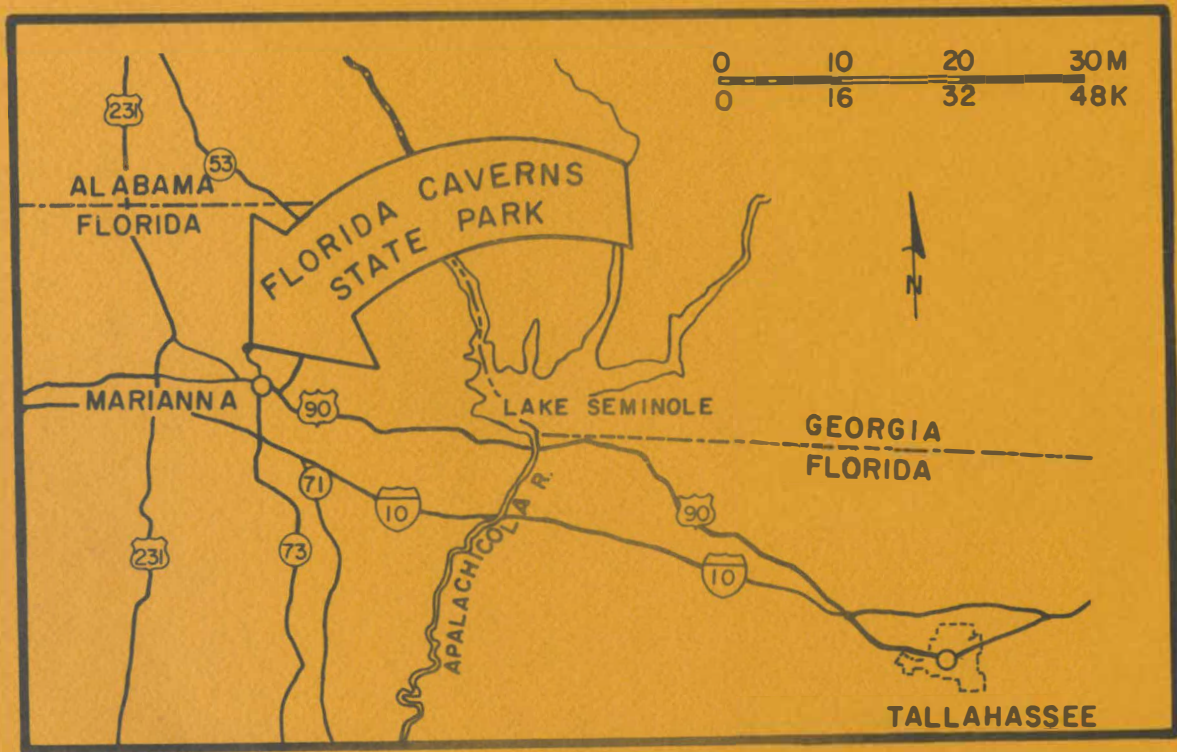
The Chipola River disappears into a swallow hole and reappears about 1500 feet to the southeast at the river rise. This is a natural feature common in limestone terrains. (Note: A man-made ditch was cut in the early 1900's to float logs downstream).

8. Blue Hole Spring

This natural groundwater discharge is the source of the Carters Mill Branch, which flows as a tributary into the Chipola River. The spring water, which maintains a year-round average temperature of 22.0 °C (71.6 °F), flows to the surface from depths within the limestone. It has been developed into a swimming and picnic area. Because the water is primarily attributed to spring flow, it is generally clear, except near the bottom where vegetation is prevalent, making the water a murky brown. The spring discharge has been measured at 56.8 cubic feet per second (36.6 million gallons per day); this discharge varies at different times of the year in response to rainfall.



Location of some geologic features that can be observed throughout the park.



Location of Florida Caverns State
Park.