



Florida Caverns State Park (Jackson County) Photo by Gary Knight

Limestone Outcrop

Description: Limestone outcrops are unique assemblages of plant species that occur on exposed limestone. Limestone outcrop communities commonly occur in Florida's karst topography and are often found within geologic features such as sinkholes. Limestone outcrops are often covered with mosses, liverworts, ferns or, occasionally, with herbs and shrubs in crevices. Among the more common species are partridgeberry (*Mitchella repens*), Gulf spike-moss (*Selaginella apoda* var. *ludoviciana*), common maidenhair fern (*Adiantum capillus-veneris*), fragrant maidenhair fern (*Adiantum melanoaleucum*), netted chain fern (*Woodwardia areolata*), jack-in-the-pulpit (*Arisaema triphyllum*), southern shield fern (*Thelypteris kunthii*), and various species of panicgrass (*Panicum* spp.). A variety of rare ferns may also thrive on the exposed limestone within this community.

Limestone outcrops are common in areas of karst terrain where the limestone is near the surface. In addition to the frequent inclusion of limestone outcrops in sinkholes, they may also be found within hardwood forest communities such as mesic hammock, hydric hammock, slope forest, and upland hardwood forest in the Florida Panhandle and peninsula, and rockland hammock in extreme South Florida.

Characteristic Set of Species: abundant ferns, mosses, and liverworts

Rare Species: Rare plants that may occur on limestone outcrops include ferns that thrive in moist microclimates; these include spleenwort (*Asplenium pumilum*), modest spleenwort (*Asplenium verecundum*), brittle maidenhair fern (*Adiantum tenerum*), sinkhole fern (*Blechnum occidentale*), creeping maiden fern (*Thelypteris reptans*), southern lip fern (*Cheilanthes microphylla*), Peters' bristle fern (*Trichomanes petersii*), and Florida filmy fern (*Trichomanes punctatum* ssp. *floridanum*). Many rare fern species are restricted to limestone outcrops of extreme South Florida such as Hattie Bauer halberd fern (*Tectaria coriandrifolia*), wedgelet fern (*Odontosoria clavata*), holly vine fern (*Lomariopsis kunzeana*), and Kraus' bristle fern (*Trichomanes krausii*). Other interesting rare plant species of limestone outcrops include false rue-anemone (*Enemion biternatum*), Marianna columbine (*Aquilegia canadensis* var. *australis*; only present in the central Panhandle), Craighead's nodding-caps (*Triphora craigheadii*), Rickett's nodding-caps (*Triphora rickettii*), terrestrial peperomia (*Peperomia humilis*), and yellow hibiscus (*Pavonia spinifex*). No rare animals are restricted to this community.

Range: Limestone outcrops occur throughout Florida but are most common in North and Central Florida, in the Panhandle, and in extreme South Florida within the range of rockland hammock, marl prairie, and pine rockland.

Natural Processes: The often sheltered position of limestone outcrops supports a moist microclimate that moderates temperature extremes.

Community Variations: The vegetation of limestone outcrops varies widely according to the surrounding natural community and geographic location. Limestone outcrops in South Florida are dominated by a mostly tropical species assemblage. Northern and Central Florida limestone outcrop communities support a diverse array of temperate species.

Limestone grottoes, often referred to as "fern grottoes," are a type of limestone outcrop that support a diverse flora of mosses, liverworts, ferns, and flowering herbs growing on the exposed limestone. Several fern grottos have been described in the vicinity of the Withlacoochee River and in South Florida (Harper 1916; Small 1920; Lakela 1964; Austin et al. 1979).

Associated Communities: Limestone outcrops may occur within most natural community types and often occur within geologic features such as sinkholes. Limestone outcrops are terrestrial communities, as opposed to rocky tidal areas, which are classified as consolidated substrate.

Management Considerations: Limestone outcrops that occur within sinkholes and grottoes are extremely fragile communities, often with steep limestone walls, limited soils, and numerous rare plants. Human activities in the surrounding areas may affect the

delicate microclimate of a sinkhole/grotto and can induce deleterious vegetation responses. For example, logging of the surrounding canopy can increase both solar radiation and sedimentation levels. Major soil disturbances in the adjoining uplands could disrupt seepage water sources.

Several of the most well known grottoes in Florida (i.e., Pineola Fern Grotto [Citrus County], Battle of Wahoo Swamp [Sumter County]) are not protected, have been used as limestone mine areas (Lakela 1964), and are further threatened by exotic invasive species. Protection of these sites is important not only for the conservation of the rare species that occupy them, but for the preservation of these unique land features.

Invasive exotic species are sometimes problematic in areas of limestone outcrops. Their establishment is often facilitated by the shaded, humid environmental conditions. Invasive species occurring in limestone outcrops include coral ardisia (*Ardisia crenata*), skunk vine (*Paederia foetida*), Japanese climbing fern (*Lygodium japonicum*), heavenly bamboo (*Nandina domestica*), giant reed (*Arundo donax*), air-potato (*Dioscorea bulbifera*), Chinese brake fern (*Pteris vittata*), and Cretan brake (*Pteris cretica*). Steep slopes and the presence of sensitive plant and animal species can complicate the treatment of exotic plants.

Exemplary Sites: Devil's Millhopper State Park (Alachua County), Leon Sinks State Geological Area (Leon County), Falling Waters State Park (Washington County), Withlacoochee State Forest (Citrus County), Castellow Hammock Preserve (Dade County), Florida Caverns State Park (Jackson County)

Global and State Rank: G2/S2

Crosswalk and Synonyms:

Other synonyms: sink, limesink, banana hole, solution pit, cenote, grotto, doline, chimney hole

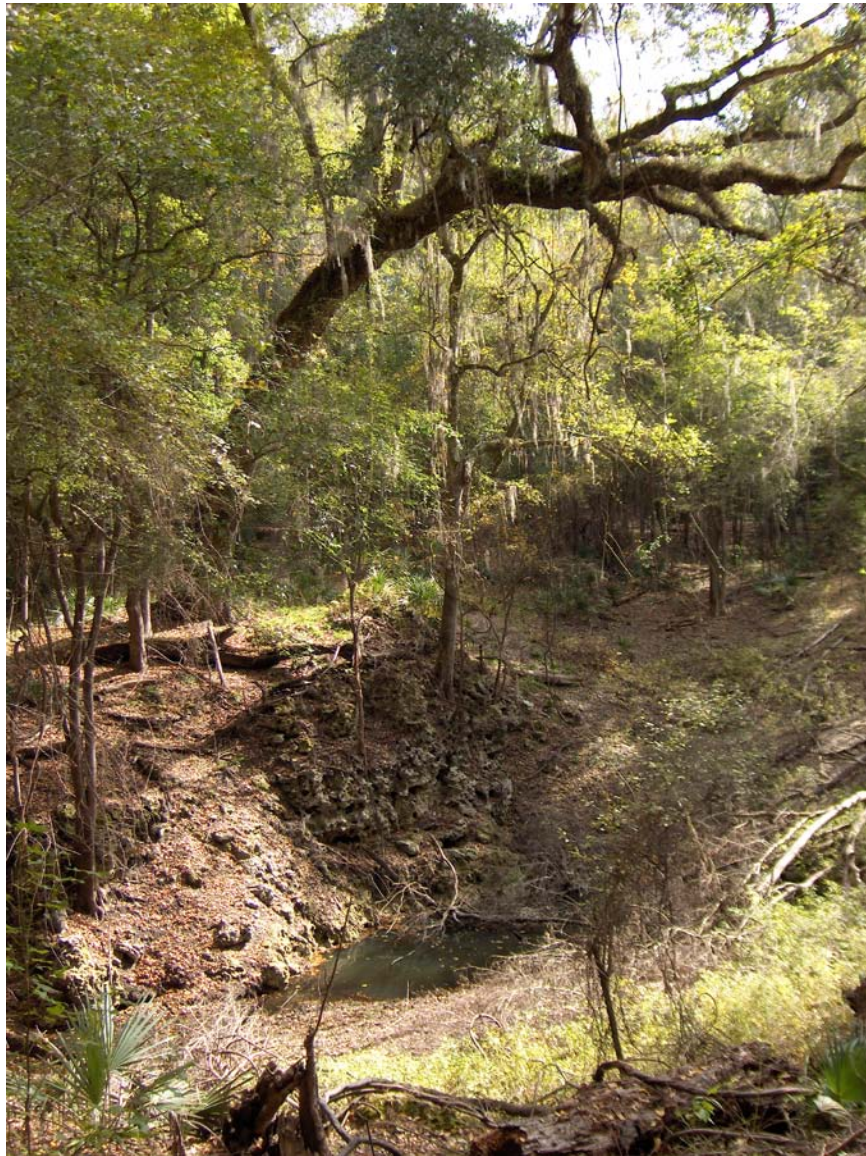
References:

Austin, D.F., G.B. Iverson, and C.E. Nauman. 1979. A tropical fern grotto in Broward County, Florida. *American Fern Journal* 14-16.

Harper, R.M. 1916. The fern grottoes of Citrus County, Florida. *American Fern Journal* 68-81.

Lakela, O. 1964. Fewer Florida rarities: changing flora of Pineola Grotto, Citrus County. *Sida* 1:299-305.

Small, J.K. 1920. Of grottoes and ancient dunes, a record of exploration in Florida in December 1918. *Journal of the New York Botanical Garden* 21:25-54.



Limestone outcrop within sinkhole, Suwannee Ridge Wildlife and Environmental Area (Hamilton County) Photo by Paul Russo