



Drawing of pine rockland in Miami-Dade County, circa 1890-1925, based on written and verbal eyewitness accounts, photographs from the time period, and visits to remnant sites by the artist, R.P. Elliott. Several tropical hardwood hammocks can be seen among the slash pines, and the pineland ecosystem grades into the sawgrass Everglades on the right. Man's presence is evidenced by the road, homesteader's cabin, and clearing.

The Pine Rockland Forests of Southern

The heat and humidity affect everything down here in the subtropics. Nothing is normal – our architecture is strange, our food is unusual, and the people – we have everything from Madonna to Manuel Noriega. Even our ground is different. While most of Florida is covered with sand, clay, or some other soft, springy, or otherwise pleasant substance, we have rock. Not just any ordinary rock either, but sharp, jagged, uneven, and downright unpleasant limestone. Walking on it is hard and falling on it is horrible. But to every dark cloud there is a silver lining. Our silver lining is a plant community that forms on this limestone – the pine rockland – unique to southern Florida and the Bahamas.

Pine rocklands are pine forests that have formed on the jagged limestone soils of the region. In Florida, they are found on the Miami Rock Ridge in Miami-Dade County, in the Florida Keys of Monroe County, and in the Big Cypress Swamp, in Collier and Monroe counties. Pine rocklands are dominated by a single canopy tree, South Florida slash pine (*Pinus elliottii* var. *densa*), a diverse hardwood and palm subcanopy, and a very rich herbaceous layer. The flora of pine rocklands is composed of a diverse mix of tropical and temperate plant species, including many endemic plant species. It is a fire-maintained community, requiring periodic fires to eliminate invading hardwoods, assist in nutrient cycling, and to reduce duff layers. Pine rocklands also provide critical for-

aging and nesting habitat for a diverse array of wildlife, including five federally listed animal species and neotropical migratory birds.

The elevation of pine rocklands vary from about seven meters to less than two meters above sea level. Hydrology varies along this elevation gradient. Low areas are prone to flooding in most years, while high areas may only have standing water right after a heavy rain. Also common are soil deposits on the limestone. These vary from sand in the northern portion of the Miami Rock Ridge to clayey marl in areas of lower elevation.

THE PLANT LIFE (ARE WE IN FLORIDA OR THE CARIBBEAN?)

The rich plant life of pine rocklands is influenced by the community's proximity to the



Florida

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tropics as well as its peninsular connection to the Coastal Plain. Many plants reach their northern or southern limits in the pine rocklands of southern Florida. Tropical plants whose entire U.S. distribution is limited to pine rocklands include Bahama sachsia (*Sachsia polycephala*), pineland daisy (*Chaptalia albicans*), quailberry (*Crossopetalum ilicifolium*), and shrub eupatorium (*Koanophyllon villosum*). A number of species in pine rocklands are disjunct from sandhill communities in Central Florida. These include green antelopehorn (*Asclepias viridis*), smooth ticktrefoil (*Desmodium marilandicum*), dollarleaf (*Rhynchosia reniformis*), Gray's beakrush (*Rhynchospora grayi*), green-eyes (*Berlandiera subacaulis*), Michaux's snoutbean

(*Rhynchosia michauxii*), Tracy's bluestem (*Andropogon tracyi*), and viperina (*Zornia bracteata*). These plants are primarily found in deposits of sand in the northern Biscayne pinelands, although green antelopehorn (*Asclepias viridis*) can also be found on Big Pine Key.

A high degree of vascular plant endemism is also observed in the pine rockland community. Thirty one plants which occur in pine rocklands are currently treated as endemic to southern Florida. Eighteen of these are entirely restricted to pine rocklands and do not occur in other communities. These plants range from the common Florida diamondflowers (*Hedyotis nigricans* var. *floridana*) to the extremely rare Carter's

flax (*Linum carteri* var. *carteri*). Some of these endemics have very restricted ranges. Some are known only from the Florida Keys, such as narrowpod sensitive pea (*Chamaecrista lineata* var. *keyensis*) and Keys deltoid spurge (*Chamaesyce deltoidea* ssp. *serphyllum*). Some are restricted to the Miami-Rock Ridge to the north of Everglades National Park, such as Carter's flax (*Linum carteri* var. *carteri*) and hairy deltoid spurge (*Chamaesyce deltoidea* ssp. *adhaerens*). These plants are known only from a few forest fragments.

Common shrub species in pine rocklands include wax-myrtle (*Myrica cerifera*) and white indigoberry (*Randia aculeata*). When fires have not occurred recently, hardwoods such as strangler fig (*Ficus aurea*) or wild-

tamarind (*Lysiloma latisiliquum*) may be present. Palms are also very common and include saw palmetto (*Serenoa repens*), silver palm (*Coccothrinax argentata*), cabbage palm (*Sabal palmetto*), and in the Florida Keys, silver thatch palm (*Thrinax morrisii*).

The herbaceous layer in pine rocklands is very diverse, with a combination of grasses, ferns, sedges, and wildflowers.

When the shrub layer in pine rockland areas is sparse, the herbaceous layer is more diverse. The herbaceous layer, like the shrub layer, is composed of both temperate and tropical species, with perennials much more common than annuals. Temperate species are most

common in the Miami Rock Ridge and Big Cypress pinelands. Typical widespread herbs include bluestems (*Schizachyrium sanguineum*, *S. gracile*, and *Andropogon longiberbis*), candyweed (*Polygala grandiflora*), creeping morning glory (*Evolvulus sericeus*), pineland heliotrope (*Heliotropium polyphyllum*), rabbit-bells (*Crotalaria rotundifolia*), and thistle (*Cirsium horridulum*).

Herbs found only in pine rocklands with deep sand layers, primarily toward the northern portions of the Miami Rock Ridge, include sticky jointvetch (*Aeschynomene viscidula*), Elliott's bluestem (*Andropogon gyrans* var. *gyrans*), whorled milkweed (*Asclepias verticillata*), big threeawn (*Aristida condensata*), pinweeds (*Lechea sessiliflora* and *L. torreyi*), coastalplain palafox (*Palafoxia integrifolia*), slenderleaf clammyweed (*Polanisia tenuifolia*), procession flower (*Polygala incarnata*), giant orchid (*Pteroglossaspis cristata*), piedmont blacksenna (*Seymeria pectinata*), hairy dawnflower (*Stylisma villosa*), tiny polygala (*Polygala smallii*), and wiregrass (*Aristida beyrichiana*). The wetter sands in the Big Cypress support southeastern sneeze-weed (*Helenium pinnatifidum*), rosy camphorweed (*Pluchea rosea*), small butterwort (*Pinguicula pumila*), and yellow colicroot (*Aletris lutea*). Herbaceous species restricted to the pine rocklands on the Miami Rock Ridge include Brickell-bush (*Brickellia mosieri*), pineland daisy (*Chaptalia albicans*), and rockland morning glory (*Ipomoea tenuissima*). Tropical herbaceous species are most commonly found in pine rocklands in

the southern portions of the Miami Rock Ridge and the Florida Keys, while the Big Cypress has a stronger temperate component. Most herbs in the pine rocklands of the Florida Keys are also found on the mainland. Exceptions include the endemic Key's deltoid spurge (*Chamaesyce deltoidea* ssp. *serpyllum*) and Grisebach's dwarf morning

pineland strongback (*Bourreria cassinifolia*), pride-of-Big-Pine (*Strumpfia maritima*), narrow-leaved hoary pea (*Tephrosia angustissima* var. *angustissima*), and coral hoary pea (*T. angustissima* var. *corallicola*). Several state-listed pine rockland endemic plants have been recommended for federal listing by The Institute for Regional Conservation:

Blodgett's wild mercury (*Argythamnia blodgettii*), Brickell-bush (*Brickellia mosieri*), Carter's small flowered flax (*Linum carteri* var. *carteri*), false leadplant (*Dalea carthagenensis* var. *floridana*), few-flowered crab grass (*Digitaria pauciflora*), Key's deltoid spurge (*Chamaesyce*

deltoidea ssp. *serpyllum*), and sand flax (*Linum arenicola*). One endemic pine rockland plant is now thought to be extinct: the narrow-leaved hoary-pea (*Tephrosia angustissima* var. *angustissima*). Mrs. Britton's shadow-witch orchid (*Ponthieva brittoniae*) (see article in the Spring 1997 issue of *The Palmetto*), flor de pasmo (*Bletia patula*), and Bahama manjack (*Cordia bahamensis*) are believed to be extinct in southern Florida, although they still occur in other parts of the world.

THE FUTURE

Tragically, this special plant community has suffered many abuses over the years. Development has eliminated all but a small percentage of the community outside of the major preserves. In the part of Miami-Dade County which is outside of Everglades National Park, only about 2% of the pine rockland community remains. There have also been significant losses in the Florida Keys.

The fragments of forest that have survived are often severely fire-suppressed. Many have not been burned in decades. They are almost always very small — most are under 100 acres. Still, these remaining fragments are of tremendous importance. They contain a great diversity of native plant species. A significant number are endangered and are not protected within large preserves.

Exotic pest plants are a common and often abundant component of the flora of many sites. The shrub Brazilian-pepper

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glory (*Evolvulus grisebachii*).

RARE, THREATENED, AND ENDANGERED PLANTS

Five federally listed plants presently occur in pine rocklands. Garber's spurge (*Chamaesyce garberi*), deltoid spurge (*Chamaesyce deltoidea* ssp. *deltoidea*), tiny polygala (*Polygala smallii*), Small's milkpea (*Galactia smallii*), and crenulate lead plant (*Amorpha herbaceae* var. *crenulata*) are federally listed and occur in this community. The deltoid spurge, Small's milkpea, and crenulate leadplant are found only in Miami-Dade County. Garber's spurge (*Chamaesyce garberi*) is found primarily in pine rocklands and coastal areas of the Florida Keys, but has been found at the Charles Deering Estate in Miami-Dade County and in Everglades National Park. Tiny polygala is found in xeric to mesic habitats along the east coast from Miami-Dade to St. Lucie counties. Carter's mustard (*Warea carteri*), which is typically associated with scrub, sandhill, and scrubby flatwoods habitats of Central Florida, was also historically recorded in pine rocklands in the Coral Gables area — it has not been seen there in decades.

More than eighty state-listed plant species have been recorded in pine rocklands. Some of the rarest state-listed species which occur in pine rocklands include Brickell-bush (*Brickellia mosieri*), Carter's orchid (*Basiphyllaea corallicola*), Grisebach's dwarf morning glory (*Evolvulus grisebachii*), false leadplant (*Dalea carthagenensis* var. *floridana*),

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(*Schinus terebinthifolius*) and the exotic grass Burma Reed (*Neyraudia reynaudiana*) often form dense stands, almost completely excluding native plant species. In addition to these, approximately one hundred other exotic plant species are known to invade pine rocklands.

On the positive side, land acquisition programs have saved many pine rockland tracts from development. Many of these sites are also being managed. Fire is being reintroduced and exotic plants are being removed from many preserves. While much more work remains to be done, we still have many beautiful ex-

amples of this special plant community in southern Florida. ✨

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