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## NATURAL COMMUNITIES of Florida's Coastal Dunes

by Linda Conway Duever

This is the second of a series of articles describing the Natural Communities defined by the Florida Natural Areas inventory (FNAI). As explained in the February, 1983, *Palmetto*, this classification system must be viewed as a system of mental constructs imposed upon an infinite variety of growing, changing, intergrading, natural environments. Hence, more often than not, a given site will not precisely fit the classic description of the appropriate natural community. Below are presented idealized profiles of three related communities. By practicing comparing these to vegetation observed in the field an interested naturalist should be able to learn to identify plant communities accurately and contribute valuable site information to conservation efforts.

### BEACH DUNE

This is the "pioneer zone" of vegetation growing along a beach on the wind-blown ridges of sand just beyond the tideland. The soil here is the same sand the waves wash onto the beach, but the wind selectively lifts out the smaller particles, then blows them inshore and rearranges them into a more tightly packed substrate. Most Florida beaches are made of siliceous sand derived from quartz fragments transported by longshore currents from the north, but in some areas fragments of shell or coral predominate and the sand is considered calcareous.

At present, FNAI coarsely subdivides Beach Dune Plant Communities into three categories. The siliceous dunes are classified as Tropical Beach Dune if tropical species are prominent and as

Temperate Beach Dune if they are not. Keys Dune has similar species to Tropical Beach Dune, but occurs on calcareous sand.

Vegetation is essential to hold the dune in place. Before grasses and sprawling vines become established to shield the dune – or where vehicle tracks or foot trails have damaged them – the wind keeps picking up grains of sand from the dune face and carrying them over the crest. This creates a migrating dune that smothers inland vegetation as it travels. After stabilizing grasses take root, the blades intercept the windblown sand and cause it to fall between the stems and accumulate around the bases of the plants. This eventually buries vegetation, but pioneer plants are adapted to burial by moving sand and readily put out new growth higher up. The ultimate height of the dune is determined by the strength of the wind transporting the sand and the size of the particles it must lift.

The moving sand and salt spray make the beach environment a harsh one and the plants that have evolved to live there are generally tough, weed-like species. Many of them root easily from fragments washed ashore in storm debris and produce large floating seeds that can be transported by ocean currents. Some have become so dependent on the dune habitat that they lose vigor without shift-

ing sands constantly stimulating them to send out new shoots and reroot.

Common temperate species include sea oats (*Uniola paniculata*), beach cordgrass (*Spartina patens*), dune panic grass (*Panicum amarulum*), railroad vine (*Ipomoea pes-caprae*), beach morning glory (*Ipomoea stolonifera*), dune sunflower (*Helianthus debilis*), seaside evening primrose (*Oenothera humifusa*), beach elder (*Iva imbricata*), sea blite (*Suaeda linearis*), sea purslane (*Sesuvium portulacastrum*), sea rocket (*Cakile lanceolata*), and seaside pennywort (*Hydrocotyle bonariensis*).

Many of these species are also found on South Florida beaches, but there are subtle differences in the flora on more tropical sites. Bitter Panicum (*Panicum amarulum*) may tend to replace *Panicum amarulum*. Bay bean (*Canavalia rosea*), chaff flower (*Alternanthera maritima*), and *Chamaesyce mesembryanthemifolia* are often abundant. \*Beach peanut (*Okenia hypogaea*), \*beach star (*Remirea maritima*), and \*beach creeper (*Ernodea littoralis*) are prominent on some sites, though they are considered rare plants. There are two species endemic to Florida Beach Dunes: \*Sand-dune spurge (*Chamaesyce cumulicola*) from southwest Florida and \*Gulfcoast lupine (*Lupinus westianus*) from the Panhandle. \*Coastal vervain (*Verbena maritima*) is

found only on dunes and in pinelands in southeast Florida.

## COASTAL STRAND

Coastal Strand is the shrubby ecotone between the fines and grasses of the beach and the forest. Thus it is actually a spectrum of plant associations grading away from the sea with increasing intolerance for maritime conditions. Wind pruning is the dominant environmental influence here. Drying winds and salt spray desiccate and kill twigs on the seaward sides of the plants and often produce a smooth, dense canopy like a sheared hedge.

Strand shrubs can only become established after herbaceous plants stabilize the dune. There are subtle changes in the soils as this process takes place. The foredunes have good supplies of nitrogen, calcium, and phosphorus, but as the dunes move inland and age, nutrients are removed by wind sorting and leaching. This lower fertility in the sand is offset as vegetation contributes organic matter to the soil.

Fire is thought to be an important factor in preventing some strand communities from developing into hammocks, but it does not appear to be significant on all sites. A fire every four or five years may be necessary for the maintenance of a palmetto-dominated strand. However, so much of South Florida's coastal vegetation has been destroyed that it may be impossible to develop generalities about these plant associations and ecological processes.

For inventory purposes, FNAI sorts strand sites into Temperate Coastal Strand and Tropical Coastal Strand.

In the transition area where shrubs mix with Beach Dune plants, there may be a "prickly zone" of Spanish bayonet (*Yucca aloifolia*) and scrub prickly pear (*Opuntia compressa*). On tropical beaches clumps of \*scaevola (*Scaevola plumeri*), \*bay cedar (*Suriana maritima*), or \*sea lavender (*Tournefortia gnaphalodes*) may occur here.

Typically, the scattered clumps of shrubs at the Beach Dune interface coalesce into a dense thicket farther back from the beach. On temperate sites, saw palmetto (*Serenoa repens*), yaupon (*Ilex vomitoria*), tough bumelia (*Bumelia tenax*), and Hercules club (*Zanthoxylum clava-hercules*) are common shrubs in

this zone. Farther south, seagrape (*Coccoloba uvifera*), blackbeard (*Pithecellobium guadalupense*), cocoplum (*Chrysobalanus icaco*), white stopper (*Eugenia axillaris*), and white lantana (*Lantana involucrate*) are often prominent. Strand shrubs are commonly entangled with vines. Greenbriers (*Smilax* spp) are frequent on temperate sites. Tropical strands include love vine (*Cassytha filiformis*), grey nickerbean (*Caesalpinia crista*), coin vine (*Dalbergia ecastophyllum*), and \*necklacepod (*Sophora tomentosa*). Coastal Strand sometimes gradually grades into Scrub, and species characteristic of the two communities may be mixed over a broad transition zone.

Plants dependent upon Coastal Strand habitat include \*small-leaved melanthera (*Melanthera parvifolia*) and \*Godfrey's blazing star (*Liatrix provincialis*) found in scrubby strands, \*Cruise's goldenaster (*Chrysopsis cruiseana*) of the Panhandle, \*hairy cucumber-leaf sunflower (*Helianthus debilis* spp. *vestitus*) from west Florida, \*beach jacquemontia (*Jacquemontia eclinata*) from southeast Florida, \*Lakela's pinweed (*Lechea lakelae*) of Collier County, and \*Devil's shoestring (*Tephrosia angustissima*) of Brevard County.

In many places in South Florida, Australian pine (*Casuarina equisetifolia*) forests have displaced the native Coastal Strand. Because of habitat loss from this competition and from beachfront development, many formerly widespread tropical beach and strand species are now regarded as rare plants.

## MARITIME HAMMOCK

Where there is a high, well stabilized foredune, the Coastal Strand shrub thicket often grades into forest at the dune crest and becomes Maritime Hammock on the sheltered lee side. The even surface of the wind-pruned strand and hammock may be deceptive; sometimes the ground beneath drops off sharply and what appears to be a continuing expanse of shrub thicket is actually the forest canopy. This streamlined profile deflects the wind and prevents hurricanes from uprooting the trees. (Therefore it is important to maintain restore the hammock canopy when clearing sites for development.)

Since hammocks take many years to develop, the dune sites they grow on have

been vegetated long enough to begin developing actual soils. Canaveral, Fripp, and Palm Beach are considered the representative soil series, though very old dunes or those overlying rock outcrops may have more complex soils.

Temperate Maritime Hammock is found in north Florida and extends south on old dunes so far back from the shoreline that the water's warmth does not effectively protect the canopy from freezing. Hammocks with up to thirty percent tropical species occur as far north as Cape Canaveral, but there are few that could be classified as Tropical Coastal Hammock north of Martin County. Hammocks with seventy percent or more tropical species are generally found south of the 23 degree C isotherm.

Typical trees in Temperate Maritime Hammock include live oak (*Quercus virginiana*), cabbage palm (*Sabal palmetto*), redbay (*Persea borbonia*), American holly (*Ilex opaca*), magnolia (*Magnolia grandiflora*), red cedar (*Juniperus silicicola*), and wild olive (*Osmanthus americanus*). Common understory plants include saw palmetto (*Serenoa repens*), beautyberry (*Callicarpa americana*), poison ivy (*Toxicodendron radicans*), coral bean (*Erythrina herbacea*), and coontie (*Zamia* spp).

Tropical Coastal Hammock may have a canopy of gumbo limbo (*Bursera simaruba*), mastic (*Mastichodendron foetidissimum*), paradise tree (*Simarouba glauca*), lancewood (*Nectandra coriacea*), strangler fig (*Ficus aurea*), poisonwood (*Metopium toxiferum*), and a variety of other tropical trees. Prickly lime (*Zanthoxylum fagara*), limber caper (*Capparis flexuosa*), wild coffee (*Psychotria nervosa*), myrsine (*Rapanea guianensis*), rouge plant (*Rivina humilis*), snowberry (*Chiococca alba*), marlberry (*Ardisia escallonioides*), and randia (*Randia aculeate*) are among the typical understory species.

Since Maritime Hammock is often lumped with Rockland Hammock, Shell Mount, and other forests in the literature, it is difficult to determine which rare plants may specifically require this habitat. Two that are often mentioned as occurring in "coastal hammock" are \*fragrant woolly cactus (*Cereus eriophorus* var. *fragrans*), which is endemic to Florida, and \*redberry stopper (*Eugenia confusa*).

\*Suzanne Cooper, FNAI Botanist, supplied information on rare species. Those flagged with an asterisk are on the FNAI Special Plant List. Information on populations of these plants should be sent to Suzanne at the Florida Natural Areas Inventory, 254 East Sixth Avenue, Tallahassee, Florida 32303 (904/224-8207).

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