Cape Canaveral Air Force Station (Brevard County) Photo by Kimberely Gulledge

Maritime Hammock

Description: Maritime hammock is a predominantly evergreen hardwood forest growing on stabilized coastal dunes lying at varying distances from the shore. Species composition changes from north to south with temperate species dominating from the Georgia border to Cape Canaveral and tropical species increasingly prevalent south of Cape Canaveral. From the Georgia border to north of Cape Canaveral, live oak (*Quercus virginiana*), cabbage palm (*Sabal palmetto*), and red bay (*Persea borbonia*) combine to form a dense canopy. The low, streamlined profile deflects winds and generally prevents hurricanes from uprooting the trees. Additional canopy species include pignut hickory (*Carya glabra*) and southern magnolia (*Magnolia grandiflora*). Characteristic subcanopy species are red cedar (*Juniperus virginiana*) and American holly (*Ilex opaca*). Yaupon (*Ilex vomitoria*), tough bully (*Sideroxylon tenax*), wax myrtle (*Myrica cerifera*), and saw palmetto (*Serenoa repens*) are typical shrubs. The herb layer is sparse to absent (Johnson and Muller 1993b).

South of Cape Canaveral, tropical trees found in the canopy include gumbo limbo (*Bursera simaruba*), false mastic (*Sideroxylon foetidissimum)*, inkwood (*Exothea paniculata)*, white stopper (*Eugenia axillaris*), strangler fig (*Ficus aurea*) seagrape (*Coccoloba uvifera*), Spanish stopper (*Eugenia foetida*), poisonwood (*Metopium toxiferum*), blolly (*Guapira discolor*), and Florida Keys blackbead (*Pithecellobium keyense*); tropical shrubs include myrsine (*Rapanea punctata*), Simpson's stopper (*Myrcianthes fragrans*), marlberry (*Ardisia escallonioides*), wild coffee (*Psychotria*

nervosa), snowberry (*Chiococca alba*), and white indigoberry (*Randia aculeata*; Johnson et al. 1992b).

The same species are found on the Gulf coast of the peninsula of Florida with temperate canopy species with tropical understory shrubs being the prevailing type from Pasco to Lee counties, south of which more tropical trees are found in the canopy, including Jamaican dogwood (*Piscidia piscipula*) which is absent from the east coast (Johnson and Muller 1992).

On the Florida Panhandle coast, the forested portions of barrier islands are largely occupied by pine-dominated communities such as scrub, scrubby flatwoods, and mesic flatwoods, and maritime hammock is found only in isolated pockets, often where shell is mixed with the sandy substrate (Johnson and Barbour 1990). West of Gulf County, sand live oak (*Quercus geminata*) replaces live oak in the canopy, occasionally mixed with sand pine (*Pinus clausa*) and slash pine (*P. elliottii*); cabbage palm is absent, having reached its western range limit (Johnson et al. 1992a). These hammocks are classified as xeric, rather than maritime, even though they occur on barrier island dunes.

Maritime hammock occurs on deep well-drained acid quartz sands, such as Fripp soils on Little Talbot Island (Watts 1997), or well-drained, moderately alkaline quartz sands mixed with shell fragments, such as Palm Beach soils (McCollum et al. 1978) at MacArthur Beach State Park.

Characteristic Set of Species: Live oak, cabbage palm, red bay, and red cedar are characteristic of temperate maritime hammock. Gumbo limbo, seagrape, and white or Spanish stopper are characteristic of tropical maritime hammock.

Rare Species: Rare plant species found in maritime hammock include Biscayne prickly ash (*Zanthoxylum coriaceum*), an understory tree in Broward and Dade counties; silver palm (*Coccothrinax argentata*) in the understory of hammocks from Palm Beach to Dade counties, small-flowered lily thorn (*Catesbaea parviflora*) in the Keys, and the globally imperiled aboriginal prickly apple (*Harrisia aboriginum*) in hammocks on the west coast of the peninsula from Manatee to Collier counties.

Temperate and tropical maritime hammocks serve as crucial resting and foraging areas for songbirds on their fall and spring migrations to and from the tropics (Cox 1988). Though not primary habitat, maritime hammocks are often used by gopher tortoise (*Gopherus polyphemus*).

Range: North of Florida, maritime hammocks dominated by live oak with red bay, and red cedar are well-developed on the broad barriers known as "sea islands" in Georgia and South Carolina (Bellis 1995) and extend northward along the Atlantic coast as far as Cape Hatteras, North Carolina (Lopanski et al. 1988). Cabbage palm and southern magnolia range north only as far as South Carolina. Within Florida, broad barrier islands of the sea island type support large, well-developed maritime hammock south to Jacksonville. Maritime hammock is relatively continuous along the sandy Atlantic and southwest Gulf coasts of the peninsula and patchy along the Panhandle coast. From Jacksonville southward, the barrier islands narrow and the hammocks occur as relatively thin, discontinuous strips on the inland side of the barrier islands or mainland beaches and, occasionally, on the mainland shore of the lagoons, south to Cape Florida. On the

Gulf coast of the peninsula most of the barrier islands and peninsulas are long and narrow with correspondingly small, narrow areas of hammock. Maritime hammock is best developed on the few broad islands, including Caladesi, Cayo Costa, North Captiva, and the inner barrier islands at Stump Pass and Keewaydin Island. Maritime hammock is rare in Franklin and Gulf counties (Johnson and Muller 1993a).

Natural Processes: Due to their coastal location with water barriers on at least one, if not two sides**,** fire was probably naturally rare and very spotty in maritime hammock, especially on the narrower barrier islands. Maritime hammocks are principally influenced by wind-borne salt spray, storm waves, and sand burial. Salt spray from both the ocean and bay sides of islands can enter and kill the upper buds, producing smooth, "pruned" canopies of evenly increasing height away from the coast (Boyce 1954). If storm waves destroy the protective dunes seaward of the hammock, sand can blow inland, burying the trees. This process can be seen at Grayton Beach State Park (Walton County) and Fort Clinch State Park (Nassau County). In addition to physical destruction by storm waves, hammock trees are susceptible to being killed by standing salt water deposited in low areas by storm surge.

Community Variations: Although tropical maritime hammocks on the southern Atlantic and Gulf coasts of the peninsula are similar in species composition, the relative dominance of certain understory species is different. For example, white stopper and buttonwood are common in Gulf coast maritime hammocks, while Spanish stopper, inkwood, paradisetree (*Simarouba glauca*), and lancewood (*Ocotea coriacea*) are common in Atlantic coast hammocks. A few species occur only on one coast. Jamaican dogwood is found only in Gulf coast hammocks and blolly and poisonwood are found only in the Atlantic coast hammocks. Harper (1927) noted that cacti and other spiny species (*Agave sisalana*, *Acanthocereus tetragonus*) were generally more common in the understory of hammocks on the west coast than on the east. These differences may be related to annual rainfall, which on the west coast averages about 4 inches (102 mm) less than on the east coast (Winsberg 1992)

Associated Communities: Temperate maritime hammock is distinguished from mesic hammock primarily by their occurrence on coastal sand dunes, the presence of red bay in the canopy, and by an even, spray-pruned canopy shape. They can be distinguished from xeric hammocks by the live oak canopy, instead of sand live oak, and by the presence of cabbage palm. They differ from hydric hammock by their occurrence on better drained soils and the absence of signs of flooding in the understory. Tropical maritime hammock can be distinguished from rockland hammock by their occurrence on sand substrate, rather than limestone. They may be similar in species composition to coastal berm, being distinguished primarily by location along a high wave energy sandy coast, rather than a low-energy mangrove-dominated coast, and the presence of a distinct canopy layer. They are very similar to shell mounds in species composition, being distinguished by their occurrence on a natural sand deposit rather than on pure shell.

Management Considerations: Fires are naturally rare in this community, but probably occurred infrequently on larger barrier islands (Bratton 1993). Fires may weaken the canopy trees making them more susceptible to damage by other coastal stresses, such as salt spray and storm winds. Invasion by exotic Australian pine (*Casuarina equisetifolia*) and Brazilian pepper (*Schinus terebinthifolius*) following storm disturbance is an ongoing

threat. Australian pine also colonizes newly formed barrier islands, thereby pre-empting succession to native maritime hammock (Johnson 1994). Restoration of native woody species following removal of Australian pine has been successful at The Nature Conservancy's Blowing Rocks Preserve and Cape Florida State Park. These efforts have shown that it is best to start with low-growing woody species, rather than trees, in restoring hammock communities to avoid salt spray burn of the foliage in taller species. Existing hammock canopies have also been killed back by salt spray after installation of parking lots exposed them to winds off the water, e.g., Golden Sands County Park (Johnson et al. 1992b).

The composition of temperate maritime hammock has been affected by Laurel Wilt Disease, which is fatal to trees of red bay over 1 inch dbh and is caused by a fungus spread by an exotic wood-boring beetle (*Xyleborus glabratus*). Infestations were first discovered in Duval County in 2004, and by 2009 had south spread along the east coast to St. Lucie County (USFS 2009). As of 2009, there was no known means of treating diseased trees or controlling the spread of the disease. Wood or mulch from dead infected trees should not be transported to avoid creating new centers of infection. This includes the transport of firewood into, or nearby, coastal strand for the purposes of outdoor recreational fires (campfires, bonfires).

Exemplary Sites: Amelia Island State Park (Nassau County), Sebastian Inlet State Park (Brevard County), MacArthur Beach State Park (Palm Beach County), Gumbo Limbo Nature Center (Palm Beach County), Cayo Costa State Park (Lee County), Rookery Bay National Estuarine Research Reserve-Cannon Island (Collier County)

Global and State Rank: G3/S2

Crosswalk and Synonyms:

Kuchler	90/Live oak - Sea Oats
Davis	1/Coastal Strand
SCS	1/North Florida Coastal Strand
	2/South Florida Coastal Strand
Myers and Ewel	Maritime Forest
SAF	73/Southern Redcedar
	74/Cabbage Palmetto
	89/Live Oak
	105/Tropical Hardwoods
FLUCCS	425/Temperate Hardwood
	426/Tropical Hardwoods
	427/Live Oak
	432/Sand Live Oak
Whitney	beach dune systems

Other synonyms: maritime forest (Lopanski et al. 1988; Bellis 1995); coastal tropical hammock (Rutchey et al. 2006)

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