



Guana Tolomato Matanzas National Estuarine Research Reserve (St. Johns County)

Photo by Katy NeSmith

Coastal Strand

Description: Coastal strand is an evergreen shrub community growing on stabilized coastal dunes in the peninsula of Florida, often with a smooth canopy due to pruning by salt spray. It usually develops as a band between dunes dominated by sea oats (*Uniola paniculata*) along the immediate coast, and maritime hammock, scrub, or mangrove swamp communities further inland. On broad barrier islands or prograding coasts, it may also occur as patches of shrubs within a coastal grassland matrix.

Along the Atlantic coast, species composition of coastal strand changes from north to south. Temperate species dominate from the Georgia border south to Cape Canaveral, with dense saw palmetto (*Serenoa repens*) and scattered dwarfed cabbage palm (*Sabal palmetto*) on the seaward edge, which are gradually joined inland by taller shrubs, including tough bully (*Sideroxylon tenax*), yaupon (*Ilex vomitoria*), Hercules' club (*Zanthoxylum clava-herculis*), and shrubby forms of red bay (*Persea borbonia*), red cedar (*Juniperus virginiana*), and live oak (*Quercus virginiana*; Johnson and Muller 1993b). From Canaveral southward tropical species become more prevalent, including seagrape (*Coccoloba uvifera*) nearest the coast, joined further inland by Florida swampprivet (*Forestiera segregata*), myrsine (*Rapanea punctata*), buttonsage (*Lantana involucrata*), white indigoberry (*Randia aculeata*), snowberry (*Chiococca alba*), Spanish stopper (*Eugenia foetida*), blolly (*Guapira discolor*), wild lime (*Zanthoxylum fagara*) Florida Keys blackbead (*Pithecellobium keyense*), coco plum (*Chrysobalanus icaco*), coinvine (*Dalbergia ecastaphyllum*), yellow necklacepod (*Sophora tomentosa* var. *truncata*), and gray nicker (*Caesalpinia bonduc*; Johnson et al. 1992).

Along the southwest coast, where prevailing easterlies do not blow across the water, coastal strand generally does not exhibit the low, even, spray-pruned profile and the expanses of saw palmetto seen on the Atlantic coast. Many of the same tropical species found on the east coast occur here; joewood (*Jacquinia keyensis*) is found only on the west coast and saffron plum (*Sideroxylon celastrinum*), of limited occurrence on the east coast, is common here (Johnson et al. 1992).

Soils are deep well-drained sands and may be somewhat alkaline, consisting of quartz sand mixed with varying proportions of shell fragments (e.g., Palm Beach sand).

Characteristic Set of Species: saw palmetto, cabbage palm, tough bully, red bay, and live oak are characteristic of temperate coastal strand; seagrape, myrsine, buttonsage, and Florida Keys blackbead characterize tropical coastal strand.

Rare Species: Rare plant species found in coastal strand include Simpson's prickly apple (*Harrisia simpsonii*) on the Atlantic coast and joewood (*Jacquinia keyensis*) plus the highly endangered aboriginal prickly apple (*Harrisia aboriginum*) on the west coast. Species found in openings in coastal strand include coastal vervain (*Glandularia maritima*), Atlantic coast Florida lantana (*Lantana depressa* var. *floridana*), and beach jacquemontia (*Jacquemontia reclinata*) on the Atlantic coast and Gulf coast Florida lantana (*Lantana depressa* var. *sanibelensis*) on the west coast. Among rare animals, gopher tortoises (*Gopherus polyphemus*) are common in this community and southeastern beach mice (*Peromyscus polionotus peninsularis*) may use this community, particularly as a refuge during and after hurricanes.

Range: In Florida, coastal strand is relatively continuous along the sandy portion of the Atlantic coast, patchily distributed on the southwest Gulf coast, and absent on the Florida Panhandle coast where the transition zone is occupied by scrub or coastal grassland communities (Johnson and Muller 1993a). Outside of Florida, coastal strand continues north to South Carolina, although a continuous band of shrubs dominated by saw palmetto and cabbage palm are found only on the narrower barrier islands in Florida. To the west, the coasts of Alabama and Mississippi, like the Panhandle, have scrub and coastal grassland communities, rather than coastal strand, interpolated between the sea oats dune above the beach and the more stable inland communities

Natural Processes: Coastal strand is usually the first woody plant community inland from the coast, behind grassy sea oats (*Uniola paniculata*) dunes or coastal grassland and in front of taller maritime hammock on its landward side. Salt spray, blown off the water when the wind speed is high enough to produce white caps (ca. 16 mph), maintains a low, even canopy by killing the most seaward twigs of the shrubs (Boyce 1954). As salt spray is combed out of the wind stream by the more seaward dead twigs, those landward of them can grow a little taller to landward, producing a canopy that slants up away from the coast (Boyce 1954). Eventually, at a certain distance from the coast, the canopy can grow tall enough for a maritime hammock to develop. Storm waves periodically destroy sea oats dunes and the coastal strand behind them, with the resulting bare area being re-colonized first by sea oats and pioneer beach species and then by coastal grassland as the sea oats foredune is re-built and provides some protection from moving sand off the beach. The resulting coastal grassland is in turn invaded by patches of woody species which eventually coalesce into a continuous woody community of coastal strand. The

width of the band of coastal strand is determined by the degree of protection from spray provided by the foredune. If the foredune is tall and the land drops away behind it, maritime forest can grow immediately behind it and strand is confined to the top of the dune, as can be seen at MacArthur Beach State Park. If the foredune is low and the land slopes up or is level behind it, strand covers a broader area, as can be seen at Canaveral National Seashore.

There is little information on natural fire frequency in coastal strand. Since saw palmetto is a major component and is known to be very flammable, fires, once started, could spread rapidly. Measurement of the inland penetration of salt spray on the Florida coast might help answer questions as to how this factor might interact with fire in maintaining the low shrubby stature of vegetation, especially on broader sections of the coast, such as at Cape Canaveral where scrub is present on the older dune ridges. On these older ridges, the shell in the sand has been leached away over time, producing an acid, infertile substrate that favors scrub over strand species (Kurz 1942).

Community Variations: In addition to north-south variation discussed above, species composition differs between the Atlantic and Gulf coasts. Coastal strand in Lee County on the west coast is characterized by joewood which does not occur in this community on the Atlantic coast; coastal strand on the east coast from Brevard to Palm Beach counties may be dominated by Simpson's stopper (*Myrcianthes fragrans*), which is rare in strands along the west coast (Johnson et al. 1992; Johnson and Muller 1992).

Associated Communities: Coastal strand may be distinguished from scrub by the presence of short-statured live oak, calciphilic species such as cabbage palm and Hercules' club, or in the southern portion of the state, by the presence of tropical shrubs. Coastal strand lacks characteristic scrub oaks such as myrtle oak (*Q. myrtifolia*), Chapman's oak (*Q. chapmanii*), and sand live oak (*Q. geminata*), as well as Florida rosemary (*Ceratiola ericoides*). The two communities may occur on adjacent ridges in parts of St. Johns, southern Brevard, and northern Palm Beach counties, where geologically older ridges of acid quartz sand (e.g. Welaka sand) support scrub just inland from younger deposits of quartz sand mixed with shell (e.g. Palm Beach sand; Huckle et al. 1974) that support coastal strand. Both communities look very similar, since they are dominated by shrubby oak species and are spray-pruned by sea winds. However, in coastal strand, dwarfed live oak (*Quercus virginiana*) predominates, and in scrub, sand live oak (*Q. geminata*) predominates. The difference between scrub and coastal strand in this region is most apparent in April, when the scrub will still appear dark green from the old leaves of the sand live oak, while the coastal strand is light green from the new leaves of live oak, which leaf out earlier than sand live oak.

Coastal strand is distinguished from maritime hammock by the absence of distinct tree canopy and understory layers. It is distinguished from coastal berm and shell mound by its occurrence on sand deposits along a high-energy sandy coast, rather than on a shell deposits along a low-energy, mangrove-dominated coast. It is distinguished from coastal grassland by the dominance of woody, rather than herbaceous species.

Management Considerations: As mentioned, the question of natural fire frequency in this community is unresolved. On the Atlantic coast chopping and burning strand or scrub near the coast has been used to maintain or return these communities to a low

stature and prevent them from succeeding to hammock. If there are hammocks inland of these shrub stands, this treatment can suddenly expose the canopy trees to increased salt spray, since it removes the upward slanting shrub canopy that previously combed the spray out of the air before it reached the hammock. Xeric and maritime hammocks along the coast are important resting and feeding sites for migrating songbirds (Cox 1988; Meyer 1997). Chopping and fire may also open the hammock and strand communities to invasion by exotics, particularly if the treatments happen to be followed by natural disturbances which also serve to open up their canopies, such as coastal storms or hard freezes in areas with tropical species present.

Invasion by exotic plants, such as Australian pine (*Casuarina equisetifolia*), Brazilian pepper (*Schinus terebinthifolius*), latherleaf (*Colubrina asiatica*), beach naupaka (*Scaevola taccada*), Burma reed (*Neyraudia reynaudiana*), and carrotwood (*Cupaniopsis anacardioides*) following natural disturbance is an ongoing threat. Although disturbance is a natural process on the coast and native species are presumably adapted to colonize after disturbance, Australian pine can grow taller, closer to the coast, than any native species, thereby pre-empting natural succession from coastal strand to native hammocks (Johnson 1994). Australian pine has been removed at a number of sites including Keewaydin Island, Don Pedro Island State Park, Lovers Key, Hutchinson Island, and St. Lucie Inlet State Park. Re-colonization by native woody species, such as coinvine (*Dalbergia ecastaphyllum*), should not be interfered with, since the native colonizers help to deter re-invasion by exotics and are likely a successional stage leading to native maritime hammock re-establishment. Areas where Australian pine is removed require monitoring and re-treatment (spot herbicide or hand pulling) to prevent reinvasion, especially until native species become well-established.

Red bay in temperate coastal strand communities has been affected by Laurel Wilt Disease, which is caused by a fungus spread by an exotic wood-boring beetle (*Xyleborus glabratus*) and is fatal to shrubs over 1 inch dbh. Infestations were first discovered in Duval County in 2004 and, by 2009, had spread to Nassau County and southward down the coast as far as St. Lucie County (USFS 2009). As of 2009, there were 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 near, coastal strand for the purposes of outdoor recreational fires (campfires, bonfires).

Exemplary Sites: Guana Tolomato Matanzas National Estuarine Research Reserve – Guana site (formerly Guana River State Park, St. Johns County), Canaveral National Seashore (Volusia/Brevard County), Hollywood North Beach Regional Park (Broward County), Cayo Costa State Park (Lee County)

Global and State Rank: G3/S2

Crosswalk and Synonyms:

Kuchler	90/Live oak - Sea oats
Davis	1/Coastal Strand (in part)
SCS	1/North Florida Coastal Strand 2/South Florida Coastal Strand
Myers and Ewel	Dunes and maritime hammock-coastal scrub

SAF	N/A
FLUCCS	322/Coastal Scrub 426/Tropical Hardwoods
Whitney	beach dune systems

Other synonyms: saw palmetto shrubland (Rutchev et al. 2006); scrub zone (Kurz 1942); cactus thickets, shore hammocks (Harper 1927); maritime shrub community (Bellis 1995)

References:

Bellis, V.J. 1995. Ecology of maritime forests of the southern Atlantic coast: a community profile. United States Department of the Interior, National Biological Service, Washington, D.C.

Boyce, S.G. 1954. The salt spray community. *Ecological Monographs* 24:29-67.

Cox, J. 1988. The influence of forest size on transient and resident bird species occupying maritime hammocks of northeastern Florida. *Florida Field Naturalist* 16:25-34.

Harper, R.M. 1927. Natural resources of southern Florida. Pages 27-206 in 18th Annual Report. Florida Geological Survey, Tallahassee, Florida.

Huckle, H.F., H.D. Dollar, and R.F. Pendleton. 1974. Soil survey of Brevard County, Florida. United States Department of Agriculture, Soil Conservation Service in cooperation with the University of Florida Institute of Food and Agricultural Sciences, Agricultural Experiment Stations, Soil Science Department, Gainesville, Florida.

Johnson, A.F. 1994. Coastal impacts on non-indigenous species. in D.C. Schmitz and T.C. Brown, editors. An assessment of invasive non-indigenous species in Florida's public lands. Florida Department of Environmental Protection, Tallahassee, Florida.

Johnson, A.F., and J.W. Muller. 1992. An assessment of Florida's remaining coastal upland natural communities: southwest Florida. Unpublished report submitted to the Florida Department of Environmental Protection. Florida Natural Areas Inventory, Tallahassee, Florida.

Johnson, A.F., and J.W. Muller. 1993a. An assessment of Florida's remaining coastal upland natural communities: final summary report. Unpublished report submitted to the Florida Department of Environmental Protection. Florida Natural Areas Inventory, Tallahassee, Florida.

Johnson, A.F., and J.W. Muller. 1993b. An assessment of Florida's remaining coastal upland natural communities: northeast Florida. Unpublished report submitted to the Florida Department of Environmental Protection. Florida Natural Areas Inventory, Tallahassee, Florida.

Johnson, A.F., J.W. Muller, and K.A. Bettinger. 1992. An assessment of Florida's remaining coastal upland natural communities: southeast Florida. Unpublished report submitted to the Florida Department of Environmental Protection. Florida Natural Areas Inventory, Tallahassee, Florida.

Kurz, H. 1942. Florida dunes and scrub, vegetation and geology. Florida Geological Survey Bulletin 23:1-154.

Meyer, K.D. 1997. Migrant and resident bird populations during spring and fall in coastal oak scrub and maritime hammock natural communities at Cape Canaveral Air Station. Florida Natural Areas Inventory, Tallahassee, Florida.

Rutchev, K., T.N. Schall, R.F. Doren, A. Atkinson, M.S. Ross, D.T. Jones, M. Madden, L. Vilcheck, K.A. Bradley, J.R. Snyder, J.N. Burch, T. Pernas, B. Witcher, M. Pyne, R. White, T.J. Smith, III, J. Sadie, C.S. Smith, M.E. Patterson, and G.D. Gann. 2006. Vegetation classification for south Florida natural areas. Open-File Report 2006-1240. United States Department of the Interior, United States Geological Survey, Reston, Virginia.

United States Forest Service USFS. 2009. Laurel Wilt. United States Department of Agriculture. URL: <http://www.fs.fed.us/r8/foresthealth/laurelwilt/index.shtml>



Cape Canaveral Air Force Station (Brevard County)

Photo by Kimberly Gullede