



Bald Point State Park (Franklin County)

Photo by Carolyn Kindell

### **Beach Dune**

**Description:** Beach dune is a predominantly herbaceous community of wide-ranging coastal specialist plants on the vegetated upper beach and first dune above the beach (foredune). This community is usually built by sea oats (*Uniola paniculata*), a perennial rhizomatous grass, whose stems trap the sand grains blown off the beach, building up the dune by growing upward to keep pace with sand burial. Other grasses that can tolerate some sand burial include bitter panicgrass (*Panicum amarum*) and saltmeadow cordgrass (*Spartina patens*). Camphorweed (*Heterotheca subaxillaris*) often grows with sea oats where sand burial is absent or moderate and seacoast marshelder (*Iva imbricata*), a succulent subshrub, is found at the seaward base of the foredune. These species may also occupy the seaward face and crests of taller backdunes or recent storm overwash plains where the sand is not stabilized by vegetation. The upper beach area seaward of the foredune is a less stable habitat, being disturbed annually by high spring tides or storm tides, and is continually re-colonized by annuals such as sea rocket (*Cakile* spp.), crested saltbush (*Atriplex cristata*), and dixie sandmat (*Chamaesyce bombensis*), by trailing species, such as beach morning glory (*Ipomoea imperati*) and railroad vine (*Ipomoea pes-caprae* ssp. *brasiliensis*), and by the salt-tolerant grasses, seashore paspalum (*Paspalum vaginatum*) and seashore dropseed (*Sporobolus virginicus*).

**Characteristic Set of Species:** sea oats, railroad vine, bitter panicum, beach elder

**Rare Species:** Rare plant species found in the beach dune community include Godfrey's goldenaster (*Chrysopsis godfreyi*), Gulf Coast lupine (*Lupinus westianus* - in dune blowouts), late flowering beach sunflower (*Helianthus debilis* ssp. *tardiflorus*), hairy beach sunflower (*Helianthus debilis* ssp. *vestitus*), Garber's spurge (*Chamaesyce garberi*), sand-dune spurge (*Chamaesyce cumulicola*), coastal vervain (*Glandularia maritima*), Atlantic Coast Florida lantana (*Lantana depressa* var. *floridana*), coastal hoary-pea (*Tephrosia angustissima* var. *curtissii*), burrowing four-o'clock (*Okenia hypogaea*), beachstar (*Cyperus pedunculatus*), and sea lavender (*Argusia gnaphalodes*).

Several rare animal species are dependent on beaches for foraging or nesting, including beach mice, shorebirds, and sea turtles. Six subspecies of beach mouse are found on Florida beaches: four along the Panhandle coast, the Perdido Key beach mouse (*Peromyscus polionotus trissyllepsis*), the Santa Rosa beach mouse (*P. p. leucocephalus*), the Choctawhatchee beach mouse (*P. p. allophrys*), and the St. Andrews beach mouse (*P. p. peninsularis*); and two along the Atlantic coast, the Anastasia Island beach mouse (*P. p. phasma*) and the southeastern beach mouse (*P. p. niveiventris*).

Many rare shorebirds use Florida beaches for nesting. These include the state-listed snowy plover (*Charadrius alexandrinus*), American oystercatcher (*Haematopus palliatus*), black skimmer (*Rynchops niger*), least tern (*Sterna antillarum*), and roseate tern (*S. dougallii*). The federally listed piping plover (*Charadrius melodus*), which breeds further north, winters along Florida beaches. FNAI-listed shorebirds using beaches include Wilson's plover (*Charadrius wilsonia*), royal tern (*Sterna maxima*), and sandwich tern (*Sterna sandvicensis*).

Florida beaches are one of the three major nesting areas in the world for loggerhead turtles (*Caretta caretta*). Eighty percent of the nests in Florida are found on the Atlantic coast from Brevard to Broward counties. Other rare sea turtles that nest in Florida are the green (*Chelonia mydas*), the hawksbill (*Eretmochelys imbricata*), the leatherback (*Dermochelys coriacea*), and Kemp's Ridley (*Lepidochelys kempii*).

**Range:** In Florida, sandy coasts with sea oats dunes are continuous on the Atlantic coast from the state line south to Cape Florida, Miami-Dade County, and on the Gulf coast of the peninsula from Anclote Key, Pasco County, south to Cape Romano, Collier County (Johnson and Muller 1993). Between Collier and Dade counties, beaches are discontinuous, being found at two sites on the Florida Keys (Kruer 1992), four sites on the islands west of Key West, including the Marquesas (Kruer 1992) and the Dry Tortugas (Davis, Jr. 1942), on Cape Sable (Kruer 1992), and on a few of the larger outer islands of the Ten Thousand Islands (Johnson and Muller 1992). On the Panhandle coast sea oats dunes extend from the mouth of the Ochlockonee River west to the Alabama border (Johnson et al. 1992). World wide, sea oats dunes are found on sandy shores around the Gulf of Mexico from eastern Mexico north of the Yucatan Peninsula (Sauer 1967) to Florida, Cuba, and the Bahamas (Correll and Correll 1982) and extend northward along the Atlantic coast to Virginia (Stalter and Lamont 1997).

**Natural Processes:** Water and wind are the primary environmental forces that shape the ecology of beach dunes. Plants on the foredune are regularly exposed to salt spray and sand burial from onshore winds blowing across the salt water and open sandy beach; plants on the upper beach are subject to these stresses plus occasional inundation by high

seasonal or storm tides and periodic destruction by waves. The plants of the beach dune community are adapted to either withstand these stresses or to rapidly re-colonize from seed or vegetative parts following destruction. Storm waves may either erode the seaward face of the foredune, moving sand offshore to form underwater bars, or break through the dune, moving sand inland as an overwash fan (Pilkey, Jr. et al. 1984). Dune and upper beach plants colonize this new area haphazardly at first, but gradually become organized into foredune and upper beach zones as waves build the beach back up and wind moves the sand inland to build a new dune ridge. Fertilization from piles of seaweed washed up by the storm helps to speed plant growth and the re-colonization process. Once a new foredune ridge blocks salt spray and plant cover inhibits sand movement, inland herbaceous and eventually woody species can begin to replace the coastal pioneer species of the beach dune community in the backdune area.

Fire is naturally rare in this community. The shoreline location prevents fires from spreading from at least half the possible compass directions, and beach dunes typically lack the necessary fuel loads and continuity to carry fire for appreciable distances.

**Community Variations:** On Panhandle and North Florida beaches, beach pennywort (*Hydrocotyle bonariensis*) is a common trailing species, especially where deposits of seaweed provide a fertile substrate. Found only on the Panhandle coast is Gulf bluestem (*Schizachyrium maritimum*) which is dominant in the adjacent coastal grassland community but can also be found on the landward slope of the foredune. The tropical portions of the peninsula, from Brevard and Pasco counties southward, are distinguished by the presence of the baybean (*Canavalia rosea*) on the upper beach, and beachberry (*Scaevola plumieri*), bay cedar (*Suriana maritima*), coastal beach sandmat (*Chamaesyce mesembrianthemifolia*), and occasional shrubs of seagrape (*Coccoloba uvifera*) among the sea oats. Found throughout the Atlantic coast is east coast dune sunflower (*Helianthus debilis*) and found only on the tropical portion of the Atlantic coast are seaside joyweed (*Alternanthera maritima*) and beachstar (*Cyperus pedunculatus*).

**Associated Communities:** Beach dune may be distinguished from coastal grassland by its position above the immediate shoreline and by the dominance of burial-tolerant grasses such as sea oats and bitter panicum. It differs from coastal berm in its position facing the open ocean on a sandy coast rather than on a storm-deposited shell ridge on a mangrove-dominated shoreline. It is distinguished from coastal strand and maritime hammock in being dominated by herbaceous rather than woody species.

**Management Considerations:** Fires are rare to non-existent in this community. Invasion by the exotic Australian pine (*Casuarina equisetifolia*) following storm disturbance is an ongoing threat especially on the Gulf coast where sand burial may not control it from becoming established above the beach, thus changing the beach dynamics that would lead to natural succession of native vegetation. The natural successional stages following storms are not known for the southerly coasts of the peninsula. Long-term monitoring following removal of Australian pine would be helpful in determining what these stages are for various coastal situations. Certain procedures intended to make the beach more pleasant or accessible for recreational use can interfere with natural processes. Raking seaweed off the beach deprives the plants of nutrients needed for luxuriant growth following storms. In areas with strong onshore winds and stable communities protected by the foredune, paths through the sea oats dunes at right angles to the beach can promote blowouts, allowing a wave of sand to move inland burying

existing stable vegetation. This can be prevented by using dune walkovers, or winding paths parallel to the shore. Beach re-nourishment and/or piling sand to make artificial dunes may produce changes both in the beach dune vegetation and in the backdune vegetation, by altering the conditions of salt spray and sand movement to which existing plants are exposed. If restoration plantings are used, care should be taken not to plant coastal endemics outside their range. East coast dune sunflower, for example, is widely available in the nursery trade, but is native only to the Atlantic coast of Florida. If planted on the southwest Gulf coast outside its range, it could hybridize with the rare endemic hairy beach sunflower (*H. debilis* ssp. *vestitus*).

**Exemplary Sites:** Gulf Islands National Seashore (Okaloosa County); Topsail Hill State Park (Walton County), St Joseph Peninsula State Park, Canaveral National Seashore (Volusia/Brevard County), Anclote Key State Park (Pasco County), Cayo Costa Island State Park (Lee 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	Coastal Strand
SAF	N/A
FLUCCS	710/Beaches

Other synonyms: upper beach (Johnson and Barbour 1990); foredune (Johnson and Barbour 1990)

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