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East Gulf Coastal Plain Dune and Coastal Grassland

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Vegetation Type

Mixed Upland and Wetland

Map Zones

99

Geographic Range

East Gulf Coastal Plain Dune and Coastal Grasslands occurs on coastal dunes and barrier islands along the northern Gulf of Mexico from the Florida Panhandle west to southeastern Mississippi (NatureServe 2006).

Biophysical Site Description

This biophysical setting occurs primarily along the upper beach, foredune, and transitional back-dune zones of coastal beaches and barrier islands along the northern Gulf of Mexico. Dune communities are typically found on coastal areas subject to higher energy wave action (FNAI 1990). Soils are primarily wind and wave deposited well drained, quartz sands of Appalachian origin (Drehle 1973, Johnson and Barbour 1990). Dunes are built by the interaction between windblown sand and vegetation. The presence of dune grasses reduces the wind speed at ground level and cause sand grains to drop (Bagnold 1941). Coastal grasslands occur in low, flat to slightly undulating terrain behind the foredune (also identified as the transitional back-dune zone). It occurs primarily on broader barrier islands, capes and spits (FNAI 1990).

Coastal dunes and grassland systems are subject to severe physical stresses including wind and water driven sand movement, salt spray, erosion, accretion, overwash and storm events (Barbour et al. 1975). Vegetation often occurs in distinct bands or zones, and is based on the tolerance of component species to salt spray and sand burial (Johnson and Barbour 1990). Dune and grassland communities must also be able to tolerate dry, unstable, nutrient poor soils (FNAI 1990).

Vegetation Description

Vegetation seaward of the foredune is generally sparse and includes a few salt tolerant succulents and grasses including gulf sea rocket (*Cakile constricta*), beach elder (*Iva imbricata*), and salt grass (*Distichlis spicata*). A number of grasses and herbs can occur on the foredune including sea oats (*Uniola paniculata*), beach cordgrass (*Spartina patens*), bitter panicum (*Panicum amarum*), *Andropogon maritimus*, beach morning glory (*Ipomoea stolonifera*), railroad vine (*Ipomoea pes-caprae*), silver-leaf croton (*Croton punctatus*), and beach spurge (*Chamaesyce*

bombensis). Vegetation on the foredune may be sparse to dense. Both areas are subject to severe stresses from salt spray, sand movement, wave action and storms.

Vegetation in the transitional back-dune zone or coastal grassland includes many of the species above plus Gulf bluestem (*Schizachyrium maritimum*), various sedges (*Cyperus* spp.), rushes (*Juncus scirpoides*), and scattered woody goldenrod (*Chrysoma pauciflosculosa*) and rosemary (*Ceratiola ericoides*). This zone may be periodically inundated by seawater that results from dune overwash, or by sand and debris deposited during storm events. In the absence of storms, this zone may become colonized by shrubs and trees and succeed to communities typically found on more stable dunes inland such as oak scrub or pine flatwoods.

BpS Dominant and Indicator Species

Symbol	Scientific Name	Common Name
UNIOL	<i>Uniola</i>	Seaoats
DISTI	<i>Distichlis</i>	Saltgrass
SCMA3	<i>Schizachyrium maritimum</i>	Gulf bluestem
CHPA18	<i>Chrysoma pauciflosculosa</i>	Woody goldenrod
IVIM	<i>Iva imbricata</i>	Seacoast marshelder
CEER3	<i>Ceratiola ericoides</i>	Sand heath
PAAM2	<i>Panicum amarum</i>	Bitter panicgrass

Species names are from the NRCS PLANTS database. Check species codes at <http://plants.usda.gov>.

Disturbance Description

Physical factors such as salt spray, wind and wave driven sand deposition, overwash, accretion, erosion, and storm events are the primary forces acting on this system. Hurricanes frequently make landfall in the northern Gulf of Mexico and have a significant impact on coastal systems. Even when they do not make landfall in the region, the storm surge and wave action generated by an off-shore storm can have a significant impact. A total of 112 hurricanes made landfall from Wakulla County, Florida to Hancock County, Mississippi during the period 1926 to 2005 (Jarrell et. al. 1992 with updates). From the period 1851 to 2004, 36 major hurricanes (category 3 or higher) made landfall along the Gulf Coast from Louisiana to the Florida Panhandle (Blake et. al. 2005).

Fire is not thought to be a significant ecological force in the Gulf Coastal Dune and Grasslands system. The system may periodically burn when adjacent uplands burn, but the primary disturbances driving the system are the physical forces discussed above.

Fire Frequency

Severity	Avg FI	Percent of All Fires	Min FI	Max FI
Replacement				
Moderate (Mixed)				
Low (Surface)				
All Fires				

Fire interval is expressed in years for each fire severity class and for all types of fire combined (All Fires). Average FI is the central tendency modeled. Percent of all fires is the percent of all fires modeled in that severity class. Minimum and Maximum FIs show the relative range of fire intervals as estimated by model contributors, if known.

Scale Description

The overall extent of this system is unknown. This system is restricted primarily to linear coastal barrier islands along the northeastern Gulf of Mexico coast. The width of this linear system is unknown. The Gulf coast of Florida (including the peninsular region), Alabama, and Mississippi includes approximately 630 linear miles of barrier island (US Army Corps of Engineers 2002).

Disturbances, particularly large storms, can affect a high percentage of this system at one time. The impact of fire on this system is thought to be minimal.

Adjacency or Identification Concerns

Coastal dune and grassland systems transition into maritime forests, oak or rosemary dominated scrub communities, or pine flatwoods that occur on stable dune and swale topography landward of the primary dune system and transition zone.

The intensity and frequency of hurricanes in this region in the last decade has had a significant impact on this system. At the time of publication in 1990, Johnson and Barbour indicated that panhandle (Florida) barrier islands have been repeatedly struck by hurricanes during the past decade: at present there is hardly a stretch of the coast that is not in the process of recovery. There have been five additional hurricanes in the eastern Gulf of Mexico since 1990.

Coastal development and alterations including real estate development, beach armoring, beach re-nourishment and erosion are also a significant threat to this ecological system. Morton et al. (2004) indicates large portions of the gulf shoreline are eroding at average long-term rates as high as 1-3 m/yr, despite beach armoring and re-nourishment efforts.

Issues or Problems

Minimal information describing the frequency of fire or fire effects on this system could be located. The information that was identified, indicated that fire did not play a significant role in this system and that the frequency of natural ignitions (lightning strikes) was thought to be very low.

Native Uncharacteristic Conditions

Comments

Ann Johnson Florida Natural Areas Inventory

Succession Classes

Mapping Rules

Upper Layer Lifeform	Height (m)	Canopy Cover (%)									
		0-10	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
Herb	0-0.5	A	A	B	B	B	B	B	B	B	B
Herb	0.5-1.0	A	A	B	B	B	B	B	B	B	B
Herb	>1.0	A	A	B	B	B	B	B	B	B	B
Shrub	0-0.5	B	B	B	C	C	C	C	C	C	C
Shrub	0.5-1.0	B	B	B	C	C	C	C	C	C	C

Shrub	1.0-3.0	B	B	B	C	C	C	C	C	C	C
Shrub	>3.0	B	B	B	C	C	C	C	C	C	C
Tree	0-5	C	C	UN	UN	UN	UN	UN	UN	UN	UN
Tree	5-10	C	C	UN	UN	UN	UN	UN	UN	UN	UN
Tree	10-25	C	C	UN	UN	UN	UN	UN	UN	UN	UN
Tree	25-50	C	C	UN	UN	UN	UN	UN	UN	UN	UN
Tree	>50	C	C	UN	UN	UN	UN	UN	UN	UN	UN

Succession class letters A-E are described in the Succession Class Description section. Some classes use a leaf form distinction where a qualifier is added to the class letter: Brdl (broadleaf), Con (conifer), or Mix (mixed conifer and broadleaf). UN refers to uncharacteristic native or a combination of height and cover that would not be expected under the reference condition. NP refers to not possible or a combination of height and cover which is not physiologically possible for the species in the BpS.

Description

Class A 25 Early Development 1 - Open

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
UNIOL	Uniola	Seaoats	Upper
DISTI	Distichlis	Saltgrass	Upper
PAAM2	Panicum amarum	Bitter panicgrass	Upper

Description

Class includes resprouting grasses that regrow from buried rhizomes and seeds. This class typically occurs following a disturbance event such as a hurricane, sand burial, or erosion. Percent coverage is generally low and, depending on the type and magnitude of the disturbance, it may take some time before vegetation recovers its pre-disturbance coverage. Pioneer species such as sea oats tend to respond positively to moderate sand burial. Wagner (1964) found that after burial in a controlled greenhouse experiment with 3in of sand, the buried sea oats were not appreciably different from the controls after 11 months. However, extreme disturbance events may require a longer recovery period. Reynolds (1976) reported on the effects of an extreme storm event where Manasota Key was extended southward 0.6 km. After 14 years, pioneer species had only achieved 50% coverage of the new land.

Maximum Tree Size Class

None

Class B 74 Mid Development 1 - All Structures

Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
UNIOL	Uniola	Seaoats	Upper
SCMA3	Schizachyrium maritimum	Gulf bluestem	Upper
PAAM2	Panicum amarum	Bitter panicgrass	Upper
CHPA18	Chrysoma pauciflosculosa	Woody goldenrod	Upper

Description

Class is characterized by sparse to moderately dense grasses and herbs with widely scattered shrubs in the transitional or backdune zone. Vegetation on and landward of the foredune may achieve 50-70% cover. Vegetation seaward of the foredune typically remains sparse. This class may persist for a long period when subjected to chronic disturbances (moderate sand deposition and salt spray) and in the absence of severe disturbance (storms, severe erosion or overwash).

Physical forces including storms, sand burial, overwash, and salt spray remain the primary disturbances to this class. Disturbances are occurring constantly in the form of winter storms, hurricanes, wind deposited sand, overwash, etc., making it very difficult to assign probabilities for wind and weather stresses. Many of these disturbances are considered chronic, and are important to maintaining community structure and composition.

Maximum Tree Size Class

None

Class C	1	Late Development 1 - All Structures
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Indicator Species

Symbol	Scientific Name	Common Name	Canopy Position
QUMY	Quercus myrtifolia	Myrtle oak	Upper
SERE2	Serenoa repens	Saw palmetto	Upper
SCMA3	Schizachyrium maritimum	Gulf bluestem	Lower
MOCE2	Morella cerifera	Wax myrtle	Upper

Description

This class occurs in rare circumstances where a disturbance has not impacted the backdune zone and species more typical of the adjacent maritime forest communities invade into the coastal grassland. This may occur in areas less exposed to high energy waves and areas where the foredune has increased in height to the point where the backdune zone is protected from salt spray, overwash, or other effects. In the absence of disturbance, the grassland community would slowly transition into maritime hammock. More typically, disturbances associated with severe storms would overwash the foredune and kill the encroaching vegetation. Early stages may include a mix of grasses and shrubs including myrtle oak (*Quercus myrtifolia*), saw palmetto (*Serenoa repens*), and wax myrtle (*Morella cerifera*) among others. Later stages may include a higher percent cover by shrubs and invading trees.

Maximum Tree Size Class

None

Model Parameters

Deterministic Transitions

From Class	Begins at (yr)	Succeeds to	After (years)
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Early1:OPN	0	Mid1:ALL	1
Mid1:ALL	2	Mid1:ALL	999
Late1:ALL	30	Late1:ALL	999

Probabilistic Transitions

Disturbance Type	Disturbance occurs In	Moves vegetation to	Disturbance Probability	Return Interval (yrs)	Reset Age to New Class Start Age After Disturbance?	Years Since Last Disturbance
Wind or Weather or Stress	Early1:OPN	Early1:OPN	0.25	4	Yes	0
Alternative Succession	Mid1:ALL	Late1:ALL	0.0025	400	Yes	0
Wind or Weather or Stress	Mid1:ALL	Early1:OPN	0.25	4	Yes	0
Wind or Weather or Stress	Late1:ALL	Early1:OPN	0.25	4	Yes	0

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