SECTION I.

SYNOPSISES OF COASTAL
PLANT COMMUNITIES OF FLORIDA
BEACH AND DUNE COMMUNITIES

The beach/dune community is a hostile environment to all but the hardiest species of plants and animals. High summer temperatures, drought conditions, low nutrient levels, unstable sands, saltwater intrusion, and occasional inundation severely limit the kinds of plants and animals that can live here. In fact, many species have developed special attributes to help them survive in this harsh environment. For instance, dune plants have high growth rates, dense root systems, low profiles, and profuse flower and seed production to compensate for restrictions imposed by severe growth conditions.

The beach/dune environment varies geographically and temporally and can be characterized as low, moderate, or high energy, depending upon the relative magnitude of wave and wind forces acting on the shoreline. The high-energy Atlantic coast of north Florida has extensive dunes (see profile in Figure 1). Dunes along the lower Atlantic coast, which is also high energy, lack the breadth of the northern dunes. Florida's Gulf coast (excluding the Panhandle region) is lower energy, and dunes have rarely formed, except for the central region from Anclote Key to Marco Island where sand deposits can be found fronting the barrier islands. The Panhandle Gulf coast is moderately high energy, and the sands are well sorted, resulting in nutrient- and organic-poor "sugar sands."

Because of the forces generated by breaking waves, beaches do not support vegetation. Immediately landward of the beach above the highest tides, pioneer dune areas are colonized by low herbs (e.g., sea-rockets, sand atriplex, seaside evening-primrose) that become established in the organic debris deposited by wind and waves. As sand accumulates around these plants, the dune feature increases in height, forming the primary, or fore dune. Fore dunes increase in size when low, tough, rhizomatous plants -- such as sea-oats or bitter panicum -- trap and stabilize the shifting sands. Dune fields are a series of older dunes that are more stable and have higher organic content. In areas where dune erosion is extensive or offshore sand sources are limited, dune fields may be narrow or completely absent. When dune soils accumulate sufficient organic material, colonizing woody vegetation (e.g., groundsel-bush, wax-myrtle, or cabbage palm) forms the dense scrub/shrub zone. Upon further development, the oldest dunes may be colonized by trees.
Figure 1. Typical Florida sand dune showing common vegetation patterns.
and shrubs, forming the maritime forest. Distinctive communities, called "hammocks," may form on deeper, organic soils. Hammocks often contain tropical species, even as far north as the Cedar Keys on the west coast and Cape Canaveral on the east coast.

Approximately 800 miles of the more than 1300 miles of linear coastline of Florida fronting the Atlantic Ocean and Gulf of Mexico are sandy beaches. These beaches are a primary contributor to the economy of the state. A 1986 Sea Grant study determined that the combined resident and tourist use of the beaches accounted for sales of $4.5 billion, with $164 million collected as state taxes (3). Our fragile beach/dune habitats are constantly assaulted by severe weather; rising sea level may also be cause for future concern. Also, human activities encroach upon the system and interfere with natural cycles of erosion and accretion. In a report published in April 1989 by the Florida Department of Natural Resources’ Division of Beaches and Shores, 218 miles of beach were estimated to be in a critical state of erosion (12). Hopefully, educational efforts that promote wise management practices and improve awareness of beach/dune values will help to ensure that this natural resource is available to future generations.
MARINE WETLANDS COMMUNITIES

Plant species growing in coastal wetlands must tolerate inhospitable conditions such as variable tides, high salinity, oxygen-poor sediments, and wave and current damage. Along Florida’s coastline, the three most widespread and commonly recognized wetlands plant communities are sea-grass beds, salt marshes, and mangrove forests. Sea-grasses usually occur below mean low water; salt marshes and mangrove forests are principally intertidal but may extend substantial distances landward of mean high water in gently sloping areas.

Sea-grass beds occur in estuarine systems such as the Indian River Lagoon, Biscayne Bay, Charlotte Harbor, Tampa Bay, and Apalachicola Bay. Large offshore beds occur in Florida Bay and from Anclote Key north through Apalachee Bay. Extensive salt marshes are found in, but are not limited to, the Big Bend region on the Gulf coast and the St. Johns River estuary on the Atlantic coast. Large expanses of mangroves occur from Naples south through the Everglades and northward on the Atlantic coast into Biscayne Bay. Less extensive mangrove forests are found in the Florida Keys and most estuarine systems in south Florida.

Sea-grasses are not true grasses but are actually more closely related to lilies. The most common species in Florida’s waters are turtle-grass (Thalassia testudinum), shoalgrass (Halodule wrightii), manatee-grass (Syringodium filiforme), star-grass (Halophila engelmanii), and widgeon-grass (Ruppia maritima). Although sea-grasses are important to marine productivity, the technology to establish them is undeveloped compared to marsh and mangrove species. Because of the complex culture and planting requirements for sea-grasses, nursery-grown stock is virtually nonexistent. For this reason, specific information on sea-grasses has not been included in this publication.

Salt marshes are dominated by grasses and grass-like species (Figure 2). At lower elevations, smooth cordgrass (Spartina alterniflora) is more abundant, but as elevation increases slightly, needle rush (Juncus roemerianus) becomes dominant. Needle rush is more widespread on the Gulf coast, and smooth cordgrass is more extensive on the Atlantic coast. Salt marshes are common in the northern half of Florida, but because marsh species
Figure 2. Typical Florida salt marsh. Mangroves displace marsh vegetation at lower elevations in southern regions of the state.
are easily shaded out by cold-sensitive mangroves, they are usually found only in patches along deeper mangrove margins in the southern half of the state.

Mangroves are cold-sensitive trees that grow along saline, tidally influenced shores of the tropics and subtropics. The word "mangrove" is an ecological term and does not imply a taxonomic relationship among the various species. In Florida, three species of mangroves are commonly recognized: red mangrove (*Rhizophora mangle*), black mangrove (*Avicennia germinans*), and white mangrove (*Laguncularia racemosa*). A fourth species, buttonwood (*Conocarpus erectus*), is often accepted as a mangrove because of its regular occurrence at the landward margin of the mangrove community and its close relationship to the white mangrove. Under appropriate conditions (e.g., lack of disturbance, gradual slopes, etc.), mangrove species may occur in distinct zones. Red mangrove usually occurs on the seaward margin, followed by black mangrove, white mangrove, and the most landward species, buttonwood (Figure 3).

In infrequently flooded, gentle-slope areas transitional to uplands, mangroves and salt marshes may give way to salt flats. Salt flats, also known as salterns, salt barrens, or salinas, are characterized by high-salinity substrates (90 parts per thousand [ppt] up to 125 ppt or higher) devoid of vegetation except for patches of low-growing forbs, grasses, and occasionally, stunted mangroves around the margin. During certain times of the year, salt flats are critical feeding areas for important commercial and sport-fish species. Water salinity in salt flats may vary from nearly fresh during rainy periods to highly saline (greater than 70 ppt) during spring tides. At the other salinity extreme (annual average water salinity of 0.5 to 5 ppt) where substantial freshwater input occurs, oligohaline marshes dominated by brackish-water species (e.g., saw-grass, cat-tails) develop. Oligohaline marshes are important year-round habitats for many animal species.

Coastal plants provide shelter for juvenile and adult animals, contribute nutritional energy sources that enhance marine productivity, aid in protecting uplands from varying degrees of wave damage, assist in improving and maintaining water quality, and provide complex aesthetic benefits. An estimated 383,000 acres of salt marshes and 674,000 acres of mangroves occur in Florida (17). Although salt marshes and mangrove forests cover large areas in some places, severe local destruction has depleted these resources such that decreased fisheries productivity is becoming evident.
Figure 3. Typical Florida fringe mangrove showing the commonly recognized zonation pattern.