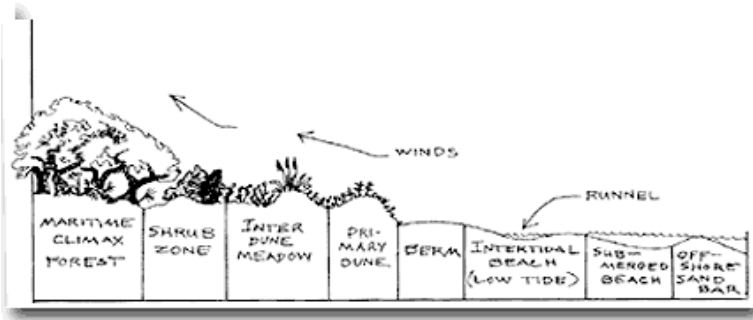


THE OCEAN BEACH

Below is a profile of an accreting ocean beach which extends from the offshore sand bar (or bars) to the edge of the maritime forest. Beach sand subject to movement by wind and water currents is highly unstable, and therefore is a hostile environment for plants and seashore life. The sand on the beach dynamically interchanges with the sand of offshore sand bars, submerged beach, and inlet shoals.



When the surf is high, as with a strong northeast wind, the waves tend to scour the sand from the berm (upper dry beach) and dunes and deposit it on the offshore bars and shoals. As a result of predominant northeast winds and large storm systems, the beaches take on a more flattened profile with scarped (buffed) dunes in the winter. When the surf energy is not as high, the action of the waves gradually works sand back to the beach. Runnels (gullies) parallel to the surf line often form where the shoreward migration of sand meets the inter-tidal beach. Through the action of the wind, the

drier sand of the intertidal beach is transported to the back beach zones and rebuilds the berm and dune systems. Eventually the net movement of sand between the beach and offshore area reaches a dynamic equilibrium, only to be temporarily offset by a passing storm or unusually high tide. Due to the predominant mild southeasterly winds, the beaches in the summer tend to build up. As each zone from the dry beach to the maritime forest becomes less exposed to the wind and salt spray, a continual succession of plant communities occurs.

The intertidal beach is wet, and its size is subject to the tidal range (relative to the moon cycle) and to the slope of the beach. Because of the gradual slope and high tidal range, the intertidal beaches of Georgia can extend as much as a quarter of a mile out to sea, and beaches near inlets because of the shoals may extend more than a mile during low tide. Due to the effects of wave action and daily inundation by sea water, the diversity of resident life is low in the intertidal zone. The majority of residents are found either in burrows or interspersed among the wet sand grains. The burrows of ghost shrimp and several kinds of polychaete worms become exposed at the lower intertidal beach during low tide. Algae living in the sand often color the wet beaches green during certain seasons and weather conditions. Coquina clams and mole crabs moving just beneath the surface of the sand filterfeed in the backwash of the surf. Myriads of tiny crustaceans (mostly amphipods) and small worms living in the wet sand (which can be exposed by flushing the sand through a screen) provide food for the sandpipers that busily probe the sand with their beaks at the edge of the surf.

The intertidal beach is also a visiting place for aquatic and terrestrial animals. Aquatic animals come in with the tide to feed and to escape from enemies. Those that die or are left stranded by the retreating tide provide food for the many shore-birds, ghost crabs, raccoons, rats, and insects. The berm is the dry sand area between the intertidal beach and the primary dunes.

The berm is usually inundated during storms and high tidal ranges and is rebuilt by the process mentioned above during milder weather and lower tideranges. With such dynamics, plant inhabitation is not permanent. Because of the extreme tidal ranges and gentle slope, the Georgia beaches are characterized by expansive intertidal zones with narrow or nonexistent berms.

Along the high tide line, windrows of marsh wrack (dead cordgrass from the marsh) are often left behind by the wave wash. The marsh wrack provides a moist environment for beach hoppers (amphipods), insects, and microorganisms, and becomes a mesh into which wind-blown sand and seeds are trapped. In this way the marsh wrack plays a vital role in forming new (incipient) dunes supporting plant growth. The 0.5-inch to 2-inch diameter holes seen at the high tide line and among the dunes are ghost crab burrows. Occasionally ghost crabs leave their burrows during the day, but at night hundreds can be seen outside, foraging in the marsh wrack.





The primary dunes offer harsh living conditions because of the salt spray, quick water drainage, shifting sand, and incessant sun exposure. This area is often considered the "desert of the beach" because many resident plants have developed adaptations to desert plants." Many have thick succulent leaves which store water and reduce leaf surface area evaporation. Some plants have deep tap roots which extend to the water table and others have extensive fibrous root systems which spread throughout the dunes to catch the rain which quickly filters through the sandy soil. In some species individual plants are interconnected by underground stems, or rhizomes, which spread over great areas of ground, furthering the chances of survival in the face of the harsh and unstable environment. As in the desert, a number of dune animals are active at night and live in burrows during the day to avoid the intense heat and light.

In front of the primary dunes and on incipient dunes, pioneer plants such as sea rocket, orach, beach croton, Russian thistle, fiddle-leaf morning glory, and the rarer railroad vine are found. On top of and between the primary dunes, grasses such as salt meadow cordgrass, bitter panic grass, dropseed grass, and sandspur grow among the pennywort, beach elder, and prickly-pear cactus. In these areas the sand has little or no humus (decaying organic matter), so essential nutrients for the plants are gleaned from the sea water spray that seeps into the sand with the rain.

Eventually sea oats become established in this area. The long curly leaves and tall oat heads trap windblown sand, burying themselves and neighboring plants under the growing dunes they create. By a process of growing new leaves and roots ahead of the accumulating sand, the sea oats continue to survive; other plants of the evolving community suffocate, degrade, and provide humus for the growing oats. This is why almost pure stands of sea oats often thrive on top of well established dunes. Because of their vital role in building and stabilizing dunes, the State of Georgia prohibits the picking of sea oats.

In the interdune meadows behind the primary dunes grows a variety of grasses, weeds, and woody plants. The types of plants vary greatly from beach to beach: depending on the age of the meadows and the content of humus and clay in the soil. Common interdune plants are camphor weed, wild bean, butterfly pea pennywort, dune primrose, yucca, grass-leaf golden aster, spurge-nettle, and the dramatic red and yellow firewheels.

In the older dunes, woody perennials (plants living for two or more years) appear among the dune grasses and herbs where the humus has built up sufficiently with time. Many of the interdune plants cannot tolerate the shade of the larger woody shrubs, and are replaced eventually by common shrub zone plants such as cat brier (green brier), Hercules'-club, muscadine grape, Virginia creeper, pepper vine, yucca, buckthorn, red bay, yaupon holly, groundsel-tree, saw palmetto, wax myrtle, red cedar, and live oak. Further from the beach, the canopy formed by the live oaks becomes higher, and many of the shrubs such as yaupon holly, wax myrtle, saw palmetto, and all of the vines except the pepper vine become understory species of the forest. Many birds, reptiles, and mammals inhabit the shrub zone because of the excellent cover and broad range of foraging and breeding environments offered by the abutting forest and nearby beach.



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