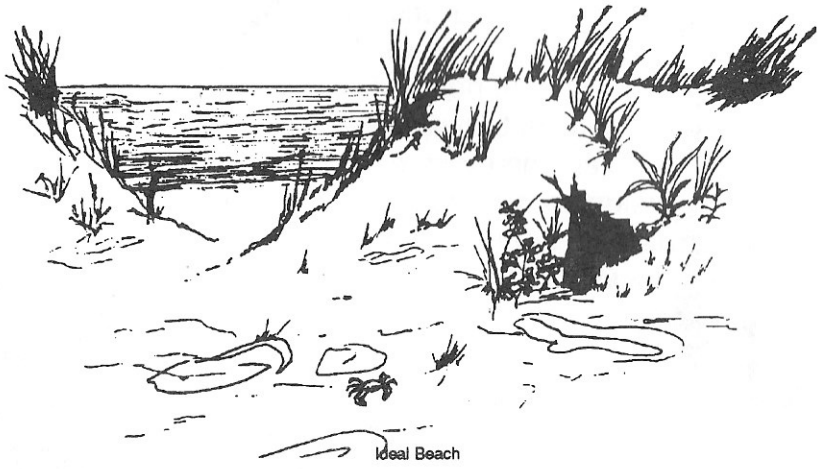


Ideal Beach

DUNES

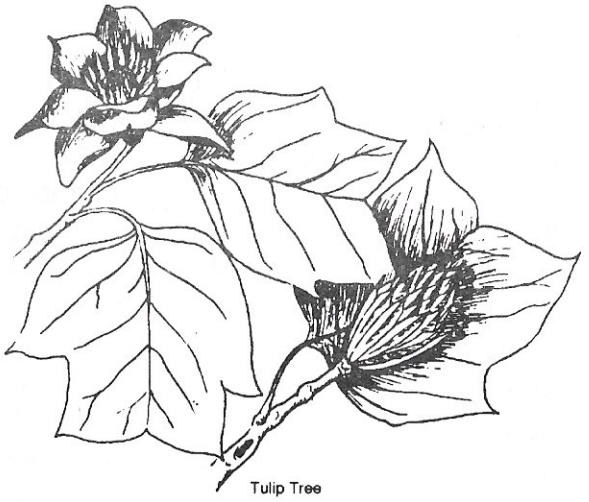
The dunes behind the shoreline are part of the beach ecosystem. Their sediment source is similar to the beach and they shift, just like the beach, with the change in sea level. However, unlike the beach with its waves and currents, the dominating influence on the dunes is wind. Wind is less efficient in moving sand and, therefore, can move only the lighter, finer grain sand compared to the coarser material found on the beach. As explained previously, the start of sea level rise and the landward advancement of the ocean shoreline caused the reworking and size-sorting of sediment along the beachfront. Once sorted and even assisting in the sorting process, winds would remove the finer sand from the beachfront and carry it downwind. The southern Raritan Bay shoreline orientation placed the backbeach area downwind of the predominant north and west winds. This orientation made it favorable for dunes to be created behind the southern Raritan Bay beachfront.

The creation of dunes was dependent on vegetation which was necessary to slow the sand-moving winds. Any decrease in wind speed by vegetation would reduce its energy to transport sand and cause the sand's deposition. The height of the dunes was dependent on the sand source but mostly on the growth rate of the dune vegetation. With a relatively constant sand source, wind-slowing vegetation would cause sand deposition as long as it could block the wind. Constant sand deposition in the dune would eventually bury the dune vegetation, eliminating the wind barrier and causing the wind blown sand to

move downwind over the dune. Equilibrium would be reached on the dune when wind erosion would remove the sand, expose the dune vegetation, and reinstitute the vegetation's wind blocking duties. The dune heights would grow with the vegetation whose growth would keep ahead of the sand buildup on the dune crest. The vegetative growth, besides causing the dune to expand, would also stabilize the dune and prevent its individual sand grains from moving.

Wave action has an impact on dunes mostly in an erosive manner during storms. At these times waves are able to advance farther up the beach due to stronger winds and storm surge. The waves erode into the dunes but are prevented from advancing farther inland. Areas of no or low unstable dunes can allow storm waves to break through the dune line washing beach sand inland. These erosive breakthroughs are called washover fans which assist in moving the shoreline landward.

The beach and dunes have been described separately because they are dynamically affected in different ways by the same physical processes. However, the beach and dunes are part of the same ecosystem and respond together to climatic changes. For the past 20,000 years the rising sea level has caused the shoreline to advance inland. This is called a transgressive shoreline. Coarser beach sands are washed inland burying the finer grain dune sands. Likewise, washover fans and wind transport fine dune sand into the backbeach areas covering either upland or wetland vegetation. Evidence of the shoreline's continued landward advance is visible along the Middletown bayshore. At Ideal Beach locust trees and other upland vegetation poke out of the dunes, slowly buried by the dunes' advance. Just east of the Comptons Creek mouth one can see wetland vegetation and mud exposed in the beach sands. This wetland vegetation is evidence of the former existence of a salt water wetland at that spot which was overrun first by the advancing dunes, and then by the advancing beach.



Tulip Tree