Species List

Raccoon (*Procyon lotor*)
Muskrat (*Ondatra zibethicus*)
Gray squirrel (*Sciurus carolinensis*)
White-Footed Mouse (*Peromyscus leucopus*)
Meadow Vole (*Microtus pennsylvanicus*)
Pine Vole (*Pitymys pinetorum*)
Norway Rat (*Rattus norvegicus*)
House Mouse (*Mus musculus*)
Eastern Cottontail (*Sylvilagus palustris*)
Opossum (*Didelphis marsupialis*)

MAN'S IMPACT ON THE BEACH AND DUNES

Man has tried to protect the beaches from erosion by building jetties, seawalls and sand dunes. By changing the shape of the shoreline in this way, we interfere with the natural evolution of the beach environment. Pollution is another way that man affects the natural beach. Littering (including broken bottles, plastic, and metal containers) poses a health risk, not only to wildlife, but to people as well. Chemical pollutants in the water are harmful to plant and animal communities inhabiting the bay waters, and also can harm man, who depends on marine organisms for food. Foot and vehicular traffic and development compromise the protection that has been built by natural succession over the years. It is important that we recognize our role in the protection of the landforms that guard our coastline. Environmental laws help with controlling man's adverse impact on these fragile habitats, but what is needed the most is for every individual to do his part to protect this unique area.

TIDAL MARSHES

MUCH MORE THAN A SWAMP

In general terms, natural wetlands are areas where intermittent saturation or shallow water conditions are principal factors in determining the character of the soil. In other words, they are lands which, due to geological or ecological factors, have a natural supply of water (either from tidal flows, flooding rivers, connections with groundwater, or because they are perched on aquifers or potholes). they are covered by or soaked with water for at least a part, and often all, of

the year. Wetlands are intermediaries between terrestrial and aquatic ecosystems: they are neither one nor the other. And yet, in a sense, they are both.

The periodic or continual presence of water in wetlands creates tremendous physiological problems for plants and animals unless they are specifically adapted for such conditions - which a surprising number of species actually are. According to reports by the United States Department of the Interior, Fish & Wildlife Service (FWS), wetlands provide important habitat to one third of the 900+ plant and animal species which the federal government lists as threatened or endangered, and they provide important nesting, migratory, and wintering areas for more than 50% of the nation's migratory birds.

Tidal salt marshes can be found throughout the world along the protected coastlines: In the United States, they are most prevalent on the East Coast, the Gulf of Mexico, and the Alaskan coastline, with narrow belts along the West Coast. Plants adapted to saline conditions and extremes in temperatures, such as salt-marsh cordgrass, typically dominate these areas in the middle and higher latitudes.

Like beaches and dunes, tidal marshes got their start 20,000 years ago with sea level rise. Ancient river and stream valleys were topographically lower than the surrounding land. During sea level rise the ocean was able to advance farther inland and flood these relatively broad low-lying features. These flooded indentations to the shoreline were protected from winds and waves and experienced low energy conditions. Daily tidal currents cycled the water in and out of the flooded valleys. The tides transported sediment into the quiet waters during maximum currents and the sediment settled out of suspension as the tidal currents slackened. Another sediment source was from the fresh water streams that were still flowing through the valleys that were being flooded by the advancing shoreline. The moving fresh water lost its sediment carrying capacity when it encountered the quiet waters of the flooded valley. With the loss of water velocity, sediment was deposited at the stream mouth.

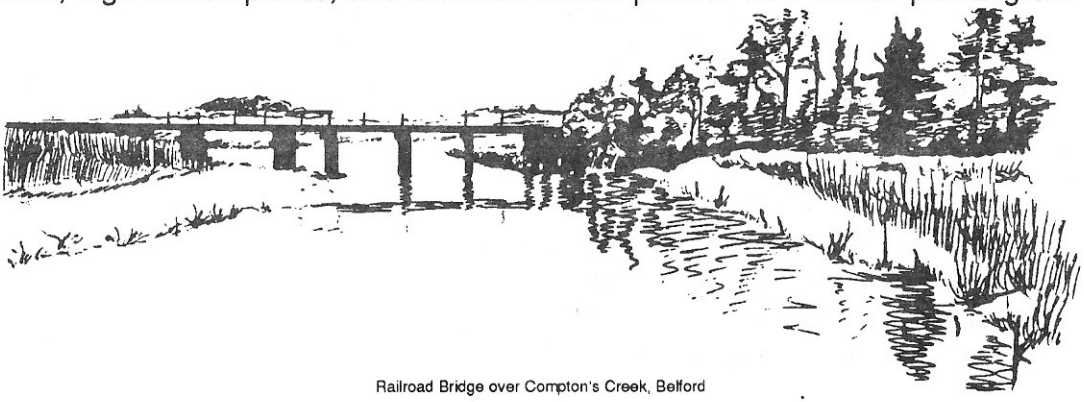
Sediment deposition, if occurring at a faster rate than sea level rise, would eventually cause the flooded stream valleys to become shallower. If the waters were shallow enough, mudflats were exposed at low tide with meandering channels developed to drain the ebbing waters. The exposure of the mudflats lead to their colonization by salt-tolerant plants. The establishment of plants on the

mudflats started the development of tidal marshes. The plants accelerated sediment accumulation by slowing water movement which caused more sediment to drop out of suspension. Mudflats increased in size which also created more plant habitat. Plant growth was hindered in the mudflat channels because of the flushing action of the tides. Water movement also prevented any sediment deposition within the channels.

The tidal marshes of the Middletown bayshore area are located within the watersheds of Pews, Comptons, and Ware Creeks. These creeks were once tributaries to the ancestral Raritan River and became flooded by the rising sea level. Littoral currents along the beach deposited sand, like Sandy Hook, across the flooded valleys of Pews and Comptons Creeks. Tidal currents kept the creek channels open and prevented the complete closure of the flooded valleys. The flood currents also brought sediment into the creeks to allow the development of wetland vegetation. The source of suspended sediment was the wave-sorting of glacial material and the turbid flood waters of the Raritan and Hudson Rivers. Stream-transported sediment from the upland portions of the creeks have also been deposited in the marshes. Within the one mile distance between Route 36 and the Raritan Bay the creek channels have a rapid salinity change. The streams are discharging fresh water into the marshes while tidal currents at the creek mouths are bringing salt water into the marshes.

PLANTS OF THE TIDAL MARSH

The plants that are typical of the tidal marshes can be classified as low marsh plants, high marsh plants, and brackish marsh plants. Low marsh plants grow



Railroad Bridge over Compton's Creek, Belford