PART II

THE NATURAL BEACH SYSTEM

Geology of Barrier Islands

(Pages 13-16 Contributed by R. Dolan)

Introduction

The Atlantic and Gulf coastal plains that form the seaward perimeter of the S.E. Region are relatively flat lands that slope gently seaward to a wide submarine continental shelf. The shore zone, or interface between the land and sea portions of the coastal plains, consists of a series of barrier islands 3 to 30 km offshore. These islands are 2 to 5 km wide, 10 to 100 km long, and low in elevation. The highest topographic features are sand dunes usually 3 to 6 m above sea level. The lagoons or bays on the sound side of the islands are shallow and may have large tidal mud flats and marshes.

The storms that generate large waves are the principal agents of change on barrier islands. Winter extratropical storms produce waves of 5 to 10 m, with storm surges of 1 to 2 m. Hurricanes (tropical storms), which occur less frequently, also cause major landscape changes, especially in the vicinity of their landfall.

Extratropical and tropical storms, with their strong waves and storm surges, often drive water and beach sands completely across the barrier island. In contrast, during periods between storms the beaches build seaward. Thus at times the barrier island shorelines move landward and at other times seaward, in response to varying energy conditions. In recent decades this movement has been mostly landward, at a rate of about 1.5 m/yr for the Atlantic coast, and somewhat less along the Gulf coast.

Origin of Barrier Islands

Barrier island formation and migration has been a subject of debate among earth scientists for many years. There is, however, evidence that most of the mid-Atlantic and Gulf coast barrier islands are migrating landward. Peats and tree stumps, remnants of forest stands on the back sides of the islands emerge on open ocean beaches, indicating barrier island migration or transgression.