

South Carolina Inlets – Where the Sand Budget Action Is

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Most of South Carolina's mixed-energy coast is characterized by well-developed, beach-ridge barrier islands and frequent tidal inlets. Lagoons and estuaries tend to be marsh-filled with incised tidal channels. A 2-meter (m) tide range and 0.5 m waves (typical) allow formation and persistence of large ebb-tidal deltas, scaled in proportion to the tidal prism. Studies dating to the 1970s by Professor Miles O. Hayes and his students have demonstrated there are three basic types of inlets along the coast: (1) naturally stable paleo channels incised in older sediments; (2) unstable, shallow migratory inlets in recent sediments; and (3) artificially stabilized inlets. Nearly all are ebb-dominant which has important implications for regional sediment budgets. Ebb-tidal deltas are sand reservoirs which trap volumes comparable to or sometimes greater than the barrier islands. Episodic sand bypassing (also referred to as "shoal bypassing") is the single, most important process controlling beach erosion and deposition in South Carolina.

This paper will provide an overview of South Carolina inlets, sand volumes associated with ebb-tidal deltas, the process of shoal bypassing, and the normal limits of sediment exchange between inlets and beaches. Inlet sediment budgets remain primitive because of the lack of comprehensive surveys and hydrodynamic data over the shoals. However, there has been expanded field data collection in the past decade, allowing for more realistic measures of shoal-bypassing volumes, depth of closure, and equilibrium delta volumes. This paper will draw on case studies from the central South Carolina coast to illustrate where the majority of sand exchange occurs. While process-driven inlet sediment budgets remain elusive, conceptual and semi-quantitative sediment budgets are important starting points. This paper will show examples applicable in other settings, which has implications for beach management because sand-budget action is squarely focused on South Carolina's ebb-tidal deltas.