

# ORIGIN, GROWTH AND EVOLUTION OF CARBONATE MUDBANKS IN FLORIDA BAY

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## ABSTRACT

Between 4,500 and 3,000 years Before Present, rising sea level inundated the area now known as Florida Bay. Coastal and freshwater peat and shore levee deposits, positioned by irregularities in the underlying limestone surface, were repeatedly embayed and overstepped during this transgression. Inundated and dissected coastal deposits then served as nuclei from which the present complex of Florida Bay islands, mudbanks, bank spits and bays evolved. Portions of the islands have maintained supratidal facies (peats and supratidal muds) throughout their growth history and are capped remnants of once laterally continuous coastal levees. Other portions are the result of supratidal progradation across younger mudbank buildups. Marine mudbanks nucleated on inundated coastal levees and mangrove peats. Mudbank cores are composed of layered mudstone reflecting an early history dominated by physical sedimentation. There is, however, striking lateral gradation in bank morphology, internal stratigraphy (textural and compositional sequence) and bank dynamics. These reflect gradients in sediment supply, physical processes and biogenic communities during later Holocene flooding history. Four zones are recognized: (1) *Inner Destructional Zone* in eastern Florida Bay has small, discontinuous erosional mudbanks with a grainstone veneer separated by rock-floored basins. This zone is sediment starved. (2) *Central Migration Zone* in central Florida Bay has an anastomosing maze of narrow, continuous banks dominated by layered mudstone sequences. These are actively migrating across a veneer of basal skeletal packstone on the limestone bedrock. This zone receives sufficient sediment supply to maintain banks. (3) *Western Constructional Zone* in western Florida Bay has very broad, actively expanding banks separated by shallow lakes containing about 1 m of molluscan wackestone. The broad banks have coalesced from smaller core banks of layered mudstone. Excess sediment from local production and/or detrital input has caused bank growth and lake infilling. (4) *Outer Destructional Zone* along the exposed western margin of Florida Bay has scattered, erosional bank remnants with layered mudstone cores surrounded by a barren Pleistocene limestone surface. Intense marine burrowing has (a) destroyed aspects of the transgressive depositional facies sequence in Florida Bay including much evidence of bank nucleation and (b) blurred evidence of physical sedimentation during the later stages of bank development. Seagrasses are a dominant community covering vast portions of bank and lake sediments in Florida Bay at present. Our studies of the Bay's sediment history indicate that (a) seagrasses are now at a peak in their influence in Florida Bay's history, (b) they are episodically eliminated from much of Florida Bay, and (c) seagrasses have had only a minor to moderate influence on the growth and evolution of Florida Bay's mudbanks.