

Late Pleistocene to Holocene Sedimentation of a Coastal System: Raritan and Sandy Hook Bays, New Jersey

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The coastal plain where Raritan Bay is presently located was adjacent to the southeast terminus of the Laurentide Ice Sheet during the Last Glacial Maximum. This region was subaerially exposed and incised by fluvial systems. After the ice retreated, eustatic rise flooded the region, sediments filled the bay and estuarine conditions developed. The goal of this study is to document the glacial to interglacial history from seismic reflection profiles and long vibracores (4-6 m; Gaswirth, 1999) and six shorter vibracores (2-3 m) recovered from the *R/V Lionel Walford*. Sediment facies were characterized from radioisotope dating and sediment composition and interpreted within the framework of the seismic lines.

Late Cretaceous sediments were unconformably overlaid by late Pleistocene strata dated at 31.7 ^{14}C ka BP (Gaswirth, 1999) and >48.0 ^{14}C ka BP. Another unconformity separated late Pleistocene from mid Holocene strata. Estuarine bivalves recovered from a paleochannel, interpreted as a tidal channel, indicate sea level first flooded the region at 6.0 to 6.1 cal. ka BP. These results are consistent with previous studies that documented global sea level reached this position at 6.0 ka BP. In contrast, previous studies of the Hudson River estuary and Long Island Sound documented first sea water incursions occurred at ~11.5 cal. ka BP and ~13.5 to 10.0 cal. ka BP, respectively. These earlier ages were related to glacial ice depressing the land. The Raritan Bay region was within the proglacial foredeep (Uchupi et al., 2001). Relative sea-level rise in depressed areas was ~1.5-0.4 mm/yr while the foredeep may have rebounded slightly faster with relative sea level rise from 0.4-0.8 mm/yr (Peltier, 1998). Mixed ages (6.8 cal ka BP above 4.1 cal ka BP) indicate extensive sediment reworking occurred after the initial flooding of sea level.

Storm deposits dominated the latest Holocene sedimentation. The hiatuses that separate these deposits are related to the time it took for the shoreline to equilibrate after large-scale erosional events so that sediments could be preserved. Five storms were preserved: mid 900's AD; 1404; 1531; 1793 and 1838. The 1404, 1793 and 1838 deposits correlate with a prehistoric storm and hurricanes that struck New Jersey and Long Island in 1404, 1788 and 1821 (Donnelly et al., 2004; Scillepi and Donnelly, 2007).