



New Jersey (USA) wetlands past, present and future: using sediment archives to inform and guide wetland protection, restoration and resilience

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Due to the rapid and pervasive loss of coastal wetland ecosystems and the enumerable services they provide, recent attention has been given to their protection and restoration. Knowledge gaps exist, however, that limit the efficacy of restoration efforts, particularly regarding response times of wetland ecosystems to natural (storms and sea-level rise) and anthropogenic impacts and the appropriate indices or metrics of ecosystem health to be incorporated in management practices to achieve restoration goals. Here we present results from monitoring studies and stratigraphic investigations from marshes across the New Jersey, USA shoreline from Delaware Bay to Raritan Bay (~210 km of coastline that vary in degree of urbanization and anthropogenic disturbances) that address these limitations. In Delaware Bay, we identify a series of abrupt contacts (mud-peat couplets) from a sequence spanning the past two thousand years that we infer result from erosive storm events. By dating the base of these contacts and the return to high salt marsh peat, we are able to estimate the recovery time of marshes under varying rates of sea-level rise. In marshes from Great Sound to Raritan Bay, we use microfossils (e.g., foraminifera, diatoms) as indices of ecosystem health. We monitor the response of microfossils to natural (e.g., changes in salinity or inundation frequency from sea-level rise) and anthropogenic (e.g., nutrient loading) influences and apply quantitative paleoenvironmental reconstruction techniques to sediment archives to understand the relative influence of these factors on New Jersey wetlands over the past two thousand years. These results can be used to inform future coastal wetland restoration targets and as a model to develop site-specific goals in other regions.