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ABSTRACT

Coastal marshes are critical natural resources that provide economic and social benefits. Continued existence of marsh habitat depends on its ability to maintain elevation relative to sea level. Currently, several anthropogenic practices are disrupting the natural processes of marsh accretion in back barrier systems by limiting sediment inputs. This study investigates if the addition of dredged material to sediment-starved marshes can offset submergence without negatively impacting function. The experiment was conducted in marshes behind Masonboro Island, NC and consisted of deteriorated and non-deteriorated sites each of which were covered by a wedge of fill sediment ranging in thickness from 0 to 10 cm. Original stem densities were greater in non-deteriorated sites (256 g/m^2) than densities in deteriorated sties (149 g/m^2). By the second growing season, stem densities in the deteriorated sites (308 g/m^2) approached levels in the non-deteriorated sites (336 g/m^2). Sediment additions to both non-deteriorated and deteriorated sites resulted in a higher oxygen potential with sites receiving the most sediment exhibiting the highest eH values. Sediment traps indicated that mean deposition rates in non-deteriorated sites (62 g/m^2) were significantly lower than in deteriorated sites (161 g/m^2). Throughout the study, deposition rates in the treated deteriorated and non-deteriorated sites have converged, which is likely a result of soupy sediments associated with deteriorated sites becoming increasingly stabilized over time. Organic content of deposited sediments was originally lower in deteriorated sites when compared to non-deteriorated sites. Over the duration of the study, however, the organic

content of materials retained in deteriorated sites increased, thus, corroborating other data indicating that sediment placement improved overall marsh conditions. Grain size of the surficial sediments has become finer over time as initial fill material has taken on sedimentological attributes of pre-fill marsh sediments. In deteriorated marshes, placement of dredged material has had the greatest effect on plant density, but has also affected soil redox and sediment deposition (mobility). Sediment addition had little impact on the non-deteriorated sites, thus indicating that the disposal of certain types of dredged material in marshes may be used to mitigate the effects of marsh degradation without adversely affecting non-deteriorating marsh.

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