

THE PHYSICAL DETERMINANTS OF SEDIMENT SALINITY AND THEIR RELATIONSHIP TO THE BROWN MARSH PHENOMENON IN LOUISIANA

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Sediment salinity in intertidal marshes is determined by a number of interactive physical variables. These include the physical properties of sediment such as permeability and field capacity, evapotranspiration rate, the elevation of the site relative to mean sea level, and the salinity of the flood water. Intertidal marshes occupy a position that is high within the intertidal zone, near the mean high tide. At this position the marsh may not flood on a regular basis. This can happen during neap tides or at times when mean sea level is unusually low. When the frequency of flooding decreases, losses of solutes by drainage and diffusion decrease, evaporation of water from the sediments increases, and the magnitude and variability of porewater salinity increase. By this mechanism, changes in mean sea level are great enough to have a significant impact on sediment salinity and, consequently, plant growth. Sediment salinity can also rise due to increases in evapotranspiration and flood water salinity caused by drought. The significance of these effects will be discussed in relation to the brown marsh phenomenon in Louisiana.