

CERF Abstract

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The Carbon Balance In A Restored Marsh at Poplar Island, MD In Upper Chesapeake Bay

Increasingly, fine grained sediment resulting from maintenance dredging of navigation channels is finding a beneficial use as a substrate in constructed tidal marshes. This material can contain large pools of available nutrients, particularly nitrogen. Recent studies suggest that nutrient enrichment can accelerate decomposition rates in natural tidal marshes, leading to increased C export via CO<sub>2</sub> losses. A two year study of a tidal marsh created at Poplar Island, Maryland, USA using fine-grained, high nutrient dredged from upper Chesapeake Bay was conducted to assess the impact of high nutrient availability on the C balance in a young created marsh. Seasonal tidal flux measurements were combined with studies of macrophyte production and decomposition, sediment C content and accretion rates to estimate key terms in the C budget. It would appear that the high nutrient status of the dredged material in the Poplar Island marshes leads to high rates of internal C cycling (respiration), but this is balanced by enhanced macrophyte production rates, leading to exceptionally high rates of vertical accretion for this region. It does not, however, appear to lead to high rates of C export to adjacent tidal waters at this site, where retention of aboveground biomass in the marshes is enhanced by 3 meter high perimeter dikes and tidal exchange is restricted to constructed inlets. Exchange via nekton and birds was not undertaken as part of this study, but preliminary measurements of methane losses from the system indicate that this may be a significant atmospheric source in summer.