

# Short-Term Sediment Deposition Rates in Riparian Marshes and Swamps Along the Lower Cape Fear River

## Abstract

The ability of tidal wetlands to maintain elevation with respect to sea level rise depends, in part, on sufficient sediment inputs. This study examined short-term sedimentation at four sites along the lower Cape Fear and Northeast Cape Fear Rivers in southeastern North Carolina. Ceramic tiles affixed to the sediment surface recorded surface deposition over four week intervals beginning in November 2004.

The two marsh sites had the highest mean sediment deposition rates of  $0.279 \pm 0.152$  g/m<sup>2</sup>/day (P6) and  $0.397 \pm 0.117$  g/m<sup>2</sup>/day (P11) respectively. This was expected due to the greater density of vegetation at marsh sites, which has been shown in previous work to have a strong effect on trapping sediment in the marsh. These sites also experience greater tidal influence than the upriver swamp sites. Thus, they may have received sediments from downstream in addition to those from upstream. This fact may also explain why the blackwater marsh site yielded higher mean deposition rates than expected. Of the two marsh sites, P11 on the blackwater Northeast Cape Fear River had the highest recorded rates of sediment deposition. P6 on the main branch of the Cape Fear River exhibited the greatest standard deviations.

The swamp sites had the lowest mean sediment deposition rates of  $0.150 \pm 0.051$  g/m<sup>2</sup>/day and  $0.162 \pm 0.094$  g/m<sup>2</sup>/day, for P8 and P13, respectively. These also had the lowest variation in deposition rates per site based on calculated standard deviations. These sites are further upstream, receive less tidal influence, and are more susceptible to changes in river discharge. Both swamp sites exhibited less variation than did the two marsh sites. It was unexpected that the blackwater swamp (P13) had a higher deposition rate than the brownwater swamp (P8) because of the higher sediment load in brownwater system. On average, the blackwater sites had higher deposition rates than the brownwater sites.

The organic content was variable among sites. As expected, the percent organic content of deposited material was greatest at the blackwater swamp location, P13. P6, the brownwater marsh had the lowest mean percent organic content. Further, the brownwater sites exhibited less variability in organic content than the blackwater sites. Sites P11 and P8 exhibited intermediate organic contents. These results suggest a decrease in organic content with increasing tidal influence and also reflect the influence of type of material suspended in the adjacent river.

Deposition rates were variable between sites and between deployment periods. P6 was highly variable between deployment periods. This could be caused in part by this site having the greatest tidal influence. P11 shows an increase in deposition rates over the sample period. For the swamp sites, both the brownwater and black water systems showed decreases in deposition over time. These data also show the lower deposition rates measured in swamp sites versus marsh sites. These results suggest that surface deposition in these wetlands depends most strongly on sediment availability in the adjacent river.

## Conclusions

1. Marsh sites have higher deposition rates than swamp sites.
2. Organic content is highest at swamp sites.
3. Mean deposition in swamp sites is decreasing over the length of the study period.
4. Anthropogenic effects may be having an impact in accretion at specific sites.
5. Streamflow and tidal range could be impacting depositional rates.