Use of CT imaging to examine the coarse roots, rhizomes, and peat associated with creek bank *Spartina alterniflora* in fertilized and control creeks in Plum Island (MA)

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We used computer-aided tomography (CT) to quantify the wet mass, abundance, and diameter of coarse roots and rhizomes as well as the wet mass and particle density of marsh peat in 7-year fertilized and control creeks in Plum Island (MA). In shallow soils (0 – 10 cm) and at depth (10 – 20 cm) there were significantly higher ($P < 0.05$; one-tailed t-test) peat particle densities and higher peat masses ($P < 0.1$; one-tailed test) in the cores ($n = 4$) collected from the fertilized Sweeney Creek compared with those collected from the control West Creek. Marsh peat particle density is inversely related with soil organic matter. The higher peat particle densities in the fertilized creek suggest that the soils are more decomposed than the control soils. We measured trends ($P < 0.15$; one-tailed t-test) of decreased abundance and mass of the coarse roots and rhizomes in the fertilized creek at depth (10 – 20 cm) in the cores, but found no detectable difference in the coarse roots and rhizomes at shallow depths. There appears to be high natural spatial variability in the masses of coarse roots, rhizomes, and peat between the branches at the control creek, which suggests that more replication is needed to detect differences between the control and fertilized creeks. The trends of low abundance and mass of coarse roots and rhizomes at depth and the significantly higher peat particle densities in the fertilized creeks, support the findings reported at other highly fertilized estuaries such as Jamaica Bay NY, where organic-rich marshes are disappearing at alarming rates, as high as 40 acres per year.

Keywords: CAT scan; belowground structure; eutrophication; Jamaica Bay; fertilization