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Allometry data and equations for coastal marsh plants

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Abstract. Coastal marshes are highly valued for ecosystem services such as protecting inland habitats from storms, sequestering carbon, removing nutrients and other pollutants from surface water, and providing habitat for fish, shellfish, and birds. Because plants largely determine the structure and function of coastal marshes, quantifying plant biomass is essential for evaluating these ecosystem services, understanding the biogeochemical processes that regulate ecosystem function,

and forecasting tidal wetland responses to accelerated sea level rise. Allometry is a convenient and efficient technique for non-destructive estimation of plant biomass, and it is commonly used in studies of carbon and nitrogen cycles, energy flows, and marsh surface elevation change. We present plant allometry data and models developed for three long-term experiments at the Smithsonian Global Change Research Wetland, a brackish marsh in the Rhode River subestuary of the Chesapeake Bay. The dataset contains 9771 measurements of stem height, dry mass, and (in 9638 cases) stem width across 11 plant species. The vast majority of observations are for *Schoenoplectus americanus* (8430) and *Phragmites australis* (311), with fewer observations for other common species: *Amaranthus cannabinus*, *Atriplex patula*, *Iva frutescens*, *Kosteletzkya virginica*, *Polygonum hydropiper*, *Solidago sempervirens*, *Spartina alterniflora*, *Spartina cynosuroides*, and *Typha angustifolia*. Allometric relationships take the form of linear regressions of biomass (transformed using the Box-Cox procedure) on either stem height and width, or on stem height alone. Allometric relationships for *Schoenoplectus americanus* were not meaningfully altered by elevated CO_2, N enrichment, the community context, interannual variation in climate, and year, showing that a single equation can be used across a broad range of conditions for this species. Archived files include: (1) raw data used to derive the allometric equations for each species, (2) reports and evaluations of the allometric equations we derived using the data, and (3) R code with which our derivations can be replicated. Methodological details of the experiments, data collection efforts, and our statistical modeling are described in the metadata. The allometric equations can be used for biomass estimation in empirical and modeling studies of North American coastal wetlands, and the data can be used in ecological studies of terrestrial plant allometry.

Key words: allometric equations; biomass estimation; coastal wetlands; elevated CO_2; nitrogen pollution; plant allometry.

The complete data set is published electronically as Supporting Information in the online version of this article: [*to be completed at proof stage*].

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