## How much Blue Carbon do Hudson Estuary Marshes Sequester? A Full-Depth Carbon Stock Estimation of Iona Marsh, Lower Hudson, NY.

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## Abstract

Tidal marshes function as a key ecosystem, by serving as nurseries, improving water quality, protecting biodiversity, preventing erosion of coastlines, and preserving archives of paleoclimate and paleoecology. In the last few decades, researchers have come to appreciate coastal marshes' carbon sequestration function. However, full peat depth is required for estimating the true carbon content of marshes, and very little research has been done to discover the full peat depth along coastlines. We selected lona Marsh (73°58'44.972"W, 41°18'6.366"N), situated adjacent to Bear Mountain Park and part of the National Estuarine Research Reserve, to document the belowground storage of blue carbon. In order to calculate marsh volume, three full-depth transects were performed from 2020 to 2022, two from east to west in different regions of the marsh, and one from north to south at a minimum of 10 m intervals. We found that marsh depth ranged from 5.1 m to 13.2 m. We calculated marsh volume from the full peat depth and marsh area, obtained through the National Wetlands Inventory database, by applying the average marsh depth over its entire surface area. In order to calculate carbon content, we extracted a 9 m sediment core and used loss-on-ignition (LOI) to determine organic matter, then estimate carbon content as half of the organic matter. We used 198 LOI samples to calculate the carbon, which formed at this site over 6000 years ago. We intend to apply this methodology framework to other marshes in the Hudson region. Because many previous carbon stock estimates only account for the top 1 m of peat, the role of these ecosystems in carbon sequestration is significantly underestimated. By determining the full-depth carbon stock of these marshes, we hope to emphasize the value of marshes to the community, beyond what is traditionally recognized, particularly in light of sea level rise and the vulnerability of marshes to erosion.