

Loss of Fixed Carbon and Nitrogen to the Atmosphere from the Estuarine Turbidity Maximum in the Hudson River

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Gases are important intermediates in the cycling of both carbon and nitrogen in the aquatic environment. The role that the major gasses in each cycle play in removing fixed carbon and nitrogen during the summer at the estuarine turbidity maximum (ETM) in the lower Hudson River was quantified using data from the New York City Harbor Survey and field measurements of CO₂, CH₄, N₂O and N₂. The resulting budget of dissolved carbon and nitrogen pools indicated that the release of these biogases to the atmosphere is a major loss term in both nutrient cycles. The loss of gaseous forms of both carbon $1.33 \cdot 10^6$ [$\mu\text{mol-C/m}^3\text{-d}$] and nitrogen $9.30 \cdot 10^2$ [$\mu\text{mol-N/m}^3\text{-d}$] exceed the supply of dissolved material to the region and suggest that particles from both upstream and downstream sources are needed to balance the observed losses. This work included the first direct measurements of denitrification in the lower Hudson and suggested rates as great as 668 [$\mu\text{mol-N/m}^2\text{-h}$].