Historical Sediment Carbon Accumulation Rates and Current Accretion Patterns in the Meadowlands of New Jersey

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The Meadowlands of New Jersey

From "The Meadowlands: A Wetlands Survival Story by Thomas F. Yezerski"
Brief History

From the collection of the Newark Museum
Blue Carbon
Blue carbon Direct Method
Blue Carbon Indirect Method
Eddy Covariance Method
Eddy Covariance Method
Monthly Net CO₂ Uptake by vegetation in 2012

Net Ecosystem Exchange - g/m²/month

Net sink 213 g C m⁻²
Meadowlands Carbon sequestration services

4,134 Acres of Wetlands

Sink Size: 3,500t t/yr

Carbon Credits: $45,000 /yr
Marsh Elevation Change
Marsh Surface Elevation Change

Diagram by J. C. Lynch
Measuring Marsh Surface Elevation Change
Vertical accretion: 3 cm in 7 years 4.5-5.5 mm year
Shallow Subsidence (mm/yr)
(Accretion - Elevation)
Elevation Change (mm)

Irene  Sandy

Lyndhurst  RB Patens  RB Mixed  SawMill  SHS

4.3 mm/yr.  (North East Average SLR: 2.6 mm/yr.)
Restricted sediments from lateral expansion of the marsh
Sediment Sources

- BCUA effluent: TSS (i) 6.6 mg/L
- Assume daily discharge of 78 million gallons
- This translates into 711 t of TSS per year
- Equivalent to 118 African male elephants/yr.
- Enough sediment to raise the marsh surface 1.6 mm every year for an area of 2,816 acres
Conclusions

• The establishment of wetland communities in the Meadowlands dates back ~ 2000 yrs.
• Salt marshes are a consistent sink for atmospheric carbon \(213 \text{ g C m}^{-2} \text{ yr}^{-1}\).
• 22% of carbon fixed through photosynthesis in a given growing season is buried, 78% remains buried after 130 years.
• Salt marshes are accreting at a rate of 4-8 mm/yr. Sea level rise for North Atlantic 2.6 mm/yr