Marsh plants enhance coastal marsh resilience by changing **sediment redox conditions** in an urban, eutrophic estuary

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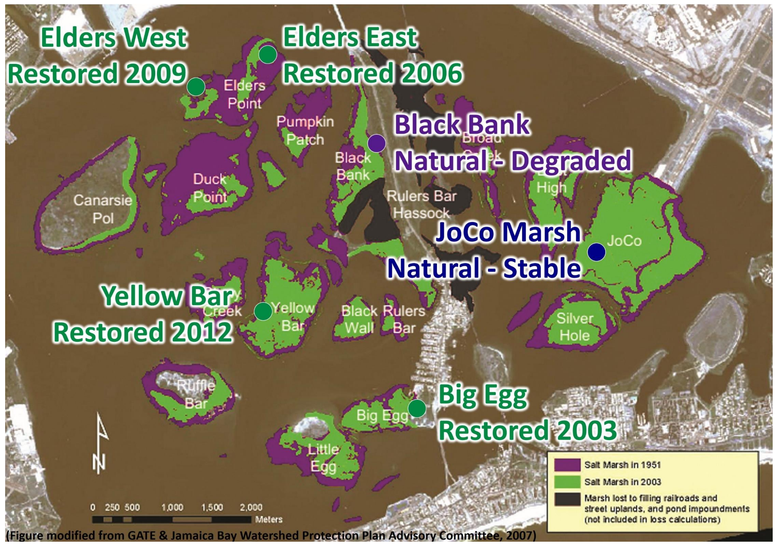
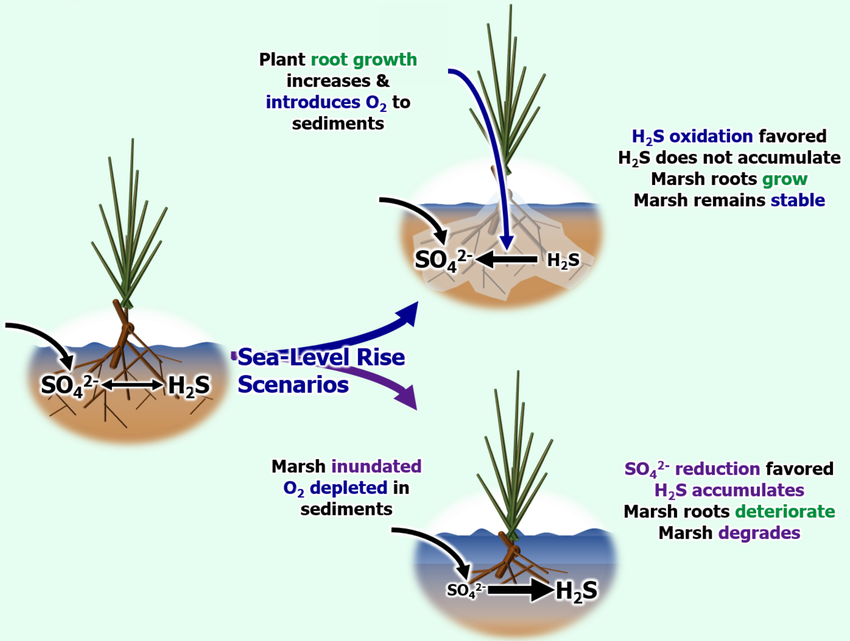
In Jamaica Bay, >**92% of historic wetland** area has been lost over the past century. We must understand the **factors** contributing to **stability** or **loss** to manage and restore **wetlands** and the **services** they provide.



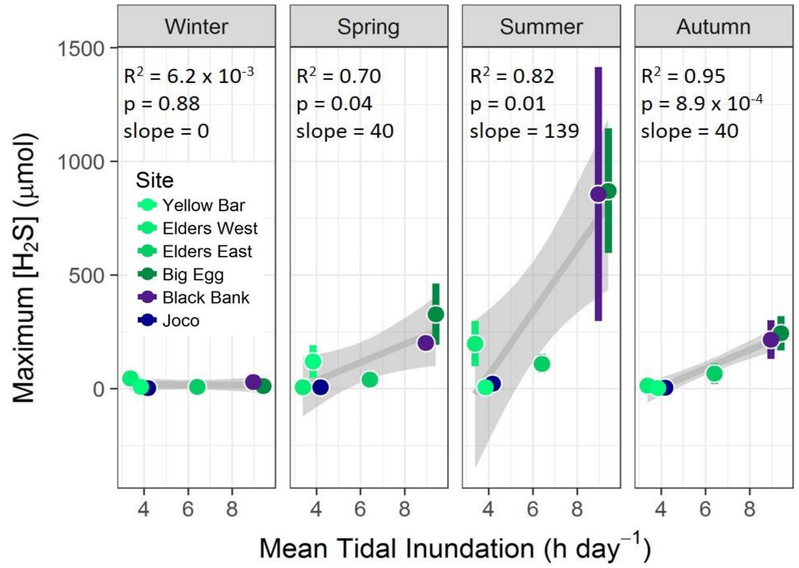
(Figure modified from GATE & Jamaica Bay Watershed Protection Plan Advisory Committee, 2007)

In eutrophic bays, **long-term anoxia** and the **accumulation of H_2S** can damage plant roots and decrease sediment stability.



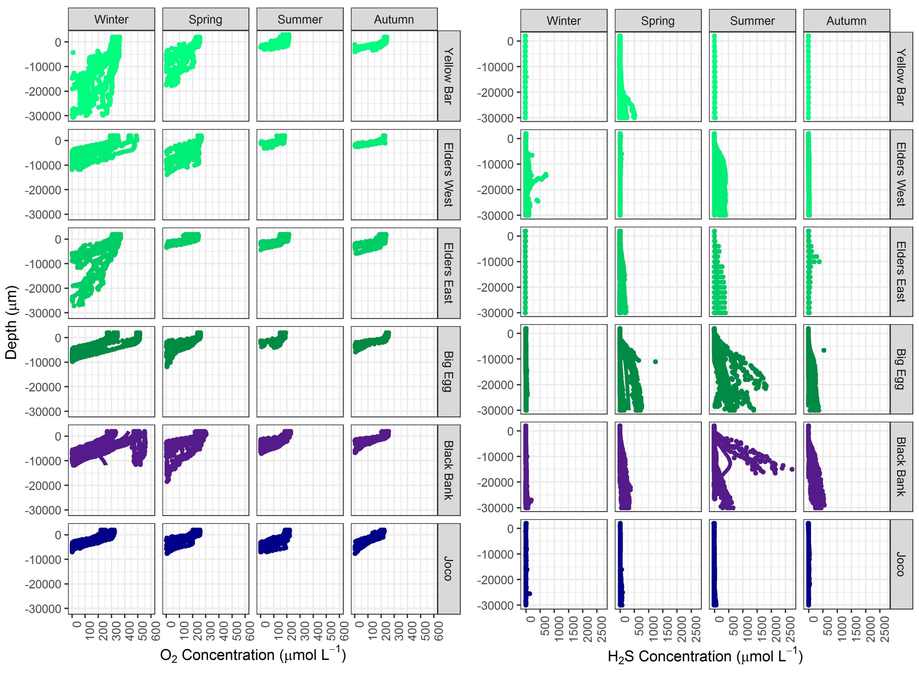
Plant roots may **facilitate O_2 diffusion** to sediments and counteract the effect of inundation.

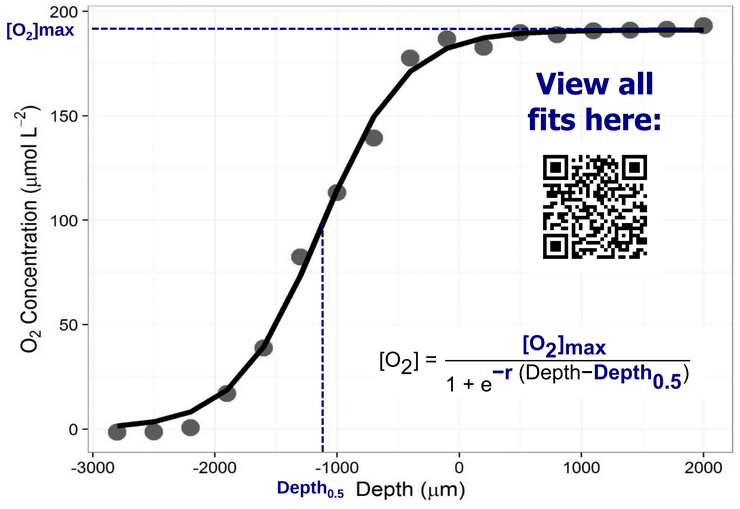
If plant growth fails to keep pace with **sea-level rise**, **O_2 becomes depleted** and **H_2S accumulates**, resulting in **decreased root growth** and **sediment instability**.



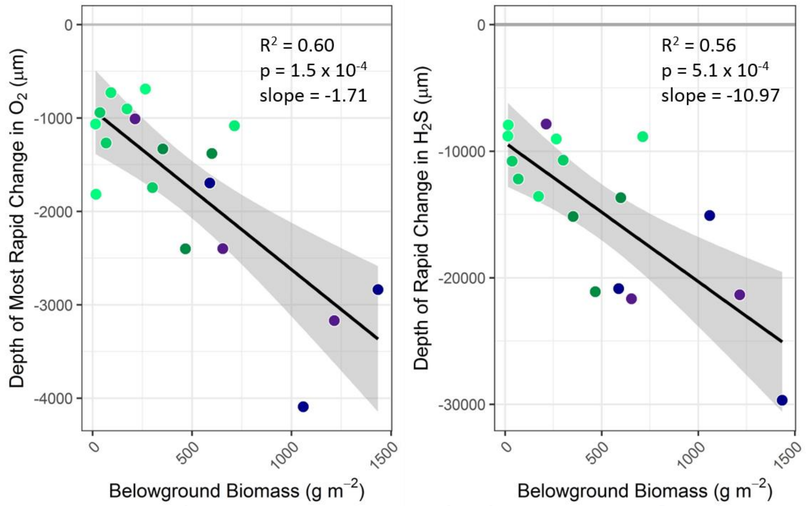
Maximum H_2S concentrations increased with daily **tidal inundation** in all seasons except winter. H_2S concentrations were greatest during the **summer**, likely due to higher rates of sediment **respiration**.

We used a Unisense Microprofiling System to measure **O_2 depletion** and **H_2S accumulation** in the rhizosphere of **marsh plants** collected across a **chronosequence** of restored marshes and in **stable** and **degraded** extant marshes.





We fit a **logistic function** to each **O_2** and **H_2S** depth profile to estimate:
1) The **maximum concentration**
2) The **rate of consumption** (or **production of H_2S**) with depth
3) The **depth of maximum consumption** (or **production of H_2S**)



During the summer, **O_2** reached a **greater depth** in sediments with greater **belowground plant biomass**. **H_2S** also accumulated at **lower depths**.

Our data show that **plant roots** facilitate **O_2 diffusion into sediments**, which may provide temporary refuge from **H_2S accumulation** in shallow sediments.

Acknowledgements

This research was supported by the Hudson River Foundation (Grant 013-15A). Special thanks to Patricia Rafferty and Jolene Willis of the National Parks Service for site access and information.