Water Quality and Seagrass Monitoring in Fire Island National Seashore, NY

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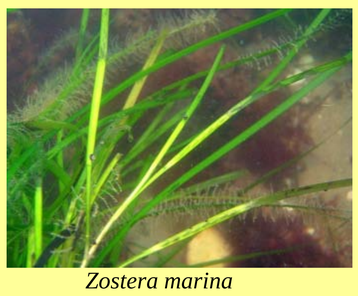
Abstract



Zostera marina

Land clearing, fertilizer use, discharge of sewage and septic systems, and fossil fuel combustion have accelerated nitrogen and phosphorus loading to coastal ecosystems since the 1950's. The Northeast (Maine to Maryland) currently accounts for a third of this country's coastal population and estuaries in this region are particularly threatened by human disturbances. Estuaries can assimilate some degree of enrichment without major ecological ramifications, but excessive nutrient inputs typically lead to dense blooms of phytoplankton and fast-growing macroalgae, loss of seagrasses, and decreased oxygen availability in sediments and bottom waters. Secondary effects include changes in the species composition and abundance of invertebrates, decline in habitat value, and potential collapse of fin- and shellfish stocks. This monitoring program uses a conceptual model linking human activities, nutrient loading, and estuarine ecosystem responses to identify the sources and consequences of nutrient inputs to park waters to assist in protecting and managing estuarine habitat within the NPS. As part of this region-wide effort, a multi-tiered protocol was developed for Fire Island National Seashore that examined dissolved oxygen, temperature, salinity, chlorophyll a, PAR attenuation and seagrass morphometrics during July-August, 2007.

Methods

Continuous Sonde Installation

We used a hierarchical framework for monitoring seagrasses and water quality in FIIS. Existing mapping programs provided information on Seagrass distribution. We supplemented this with bay-wide rapid assessment of plant cover, morphometry, and water depth at 200 random sampling locations distributed using a tessellated hexagon design. We made detailed measurements of seagrass condition (cover, density, biomass, shoot morphology, epiphytes, wasting) along a depth gradient in a reference bed.

Monitoring of Seagrass was combined with water quality and turbidity measurements through the use of a permanent sonde station. Changes in DO, turbidity, PAR attenuation, temperature, salinity and chlorophyll a were measured in high resolution over an extended period of time, allowing comparison of water quality conditions and short-term temporal trends in seagrass biomass and condition.

Laying a transect in Great South Bay

Conclusions

YSI 650MDS Sonde

Spatial interpolation of tiered data yielded snapshots of seagrass status. Use of permanent stations for water quality monitoring allowed efficient temporal comparisons. Integration across scales produced bay-wide estimations of eelgrass biomass from easily measured parameters and the opportunity for bay-wide assessment. Future use of multiple permanent sonde trend stations will allow a more detailed assessment of bay-wide water quality trends and their potential impact on seagrass populations within Fire Island National Seashore.

References:

Kopp BS and Neckles HA (2004) Monitoring Protocols for the National Park Service North Atlantic Coastal Parks: Estuarine Nutrient Enrichment. NPS Northeast Coastal and Barrier Network, Augusta, p1-163

Acknowledgements:

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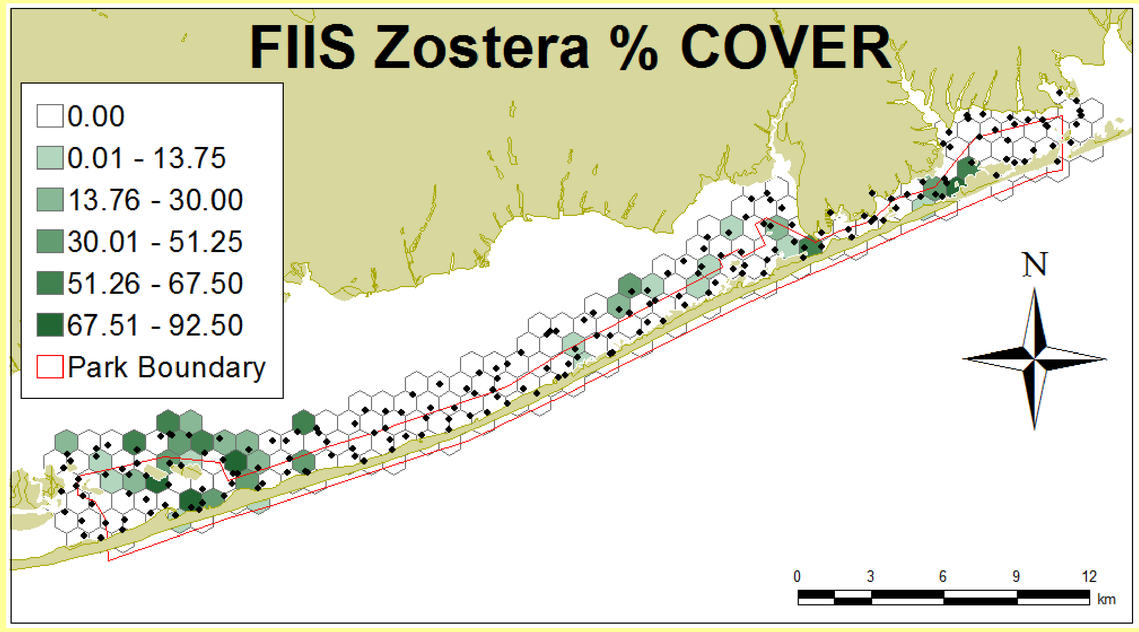
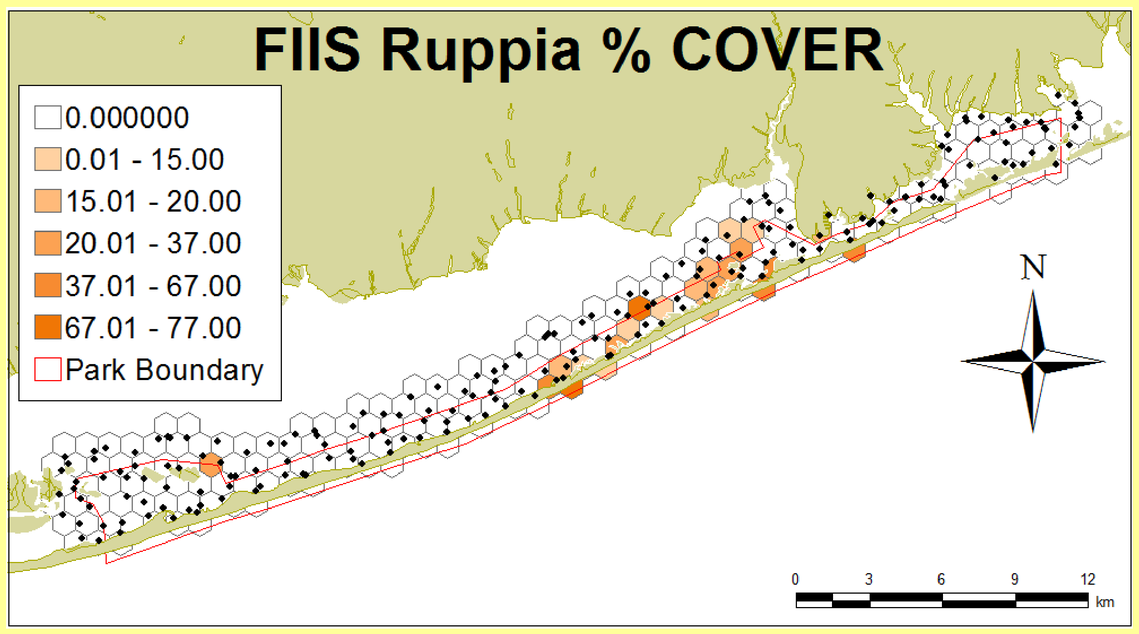
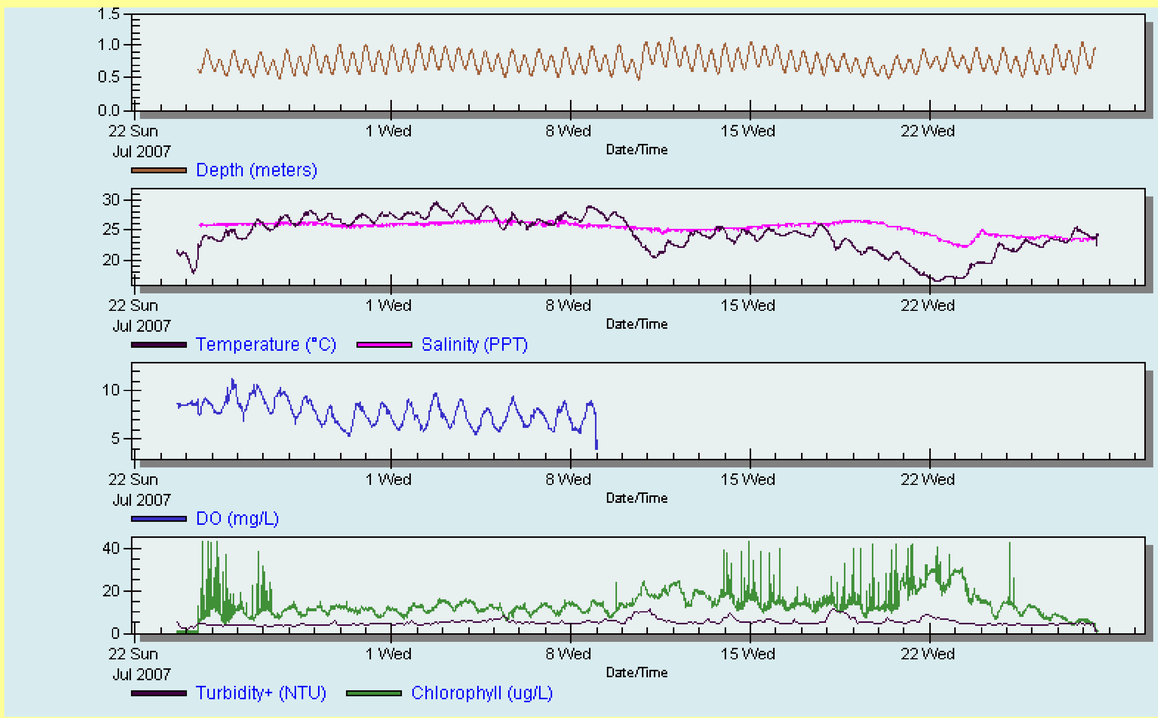




Continuous Sonde Data



Seagrass Net Survey Data