Soil Interpretations from the Coastal Zone Soil Survey of Little Narragansett Bay, Connecticut & Rhode Island

Introduction

Demand for resource inventories in coastal zone areas is gaining momentum, though soil/sediment information is commonly unavailable. Past research has focused on many components of estuarine and coastal ecosystems such as hydrology, vegetation and floral and faunal interactions. The soil/sediment substrate, which supports a wide variety of benthic invertebrates and submerged aquatic vegetation, has largely been ignored or lacked enough detail to be of ecological significance. Soil surveys have much to offer these coastal zone areas.

Soil scientists read the landscape and describe and compare soil details that enable development of specific soil interpretations. The Coastal Zone Soil Survey of Little Narragansett Bay resulted in the development of four new innovative soil interpretations including: 1) presence of sulfidic materials; 2) bottom type of material; 3) mooring suitability; 4) potential for submerged aquatic vegetation (SAV) restoration.

The need for coastal zone mapping to inform policy makers and management is important for mitigating hazards, creating resource inventories, and tracking environmental changes. Subaqueous soil interpretations will not only encourage new partnerships, but also assist all of us in making wise decisions concerning our natural resources.

Methods

A coastal zone soil survey was conducted in the upland and near shore areas (<2.5 m deep water) of Little Narragansett Bay using National Cooperative Soil Survey techniques.

Presence of sulfidic materials *(Fig. 1)* **within 1 m of the soil surface was determined using the 8 week incubation pH method.** *(Sulfidic materials are mineral or organic materials that have an initial pH value of more than 3.5 and when incubated for 8 weeks, a pH value of 4.0 or less.)*

The bottom type of material *(Fig. 2)* **was determined using the n-value, a measure of fluidity and load bearing capacity, of the soil surface layers. An n-value of slightly fluid thru very fluid was defined as a soft bottom. Hard bottom was defined as nonfluid materials having an n-value less than 0.7.**

Mooring suitability *(Fig. 3)* **was determined by incorporating recommendations from the insurance industry along with the n-value of the soil surface layers. Mushroom anchors are best suited to soft bottom materials and rely on surface area and suction to work properly. Deadweight anchors are best suited to hard bottom materials because they rely primarily on being heavy to stay in place and need to be accessible for maintenance purposes.**

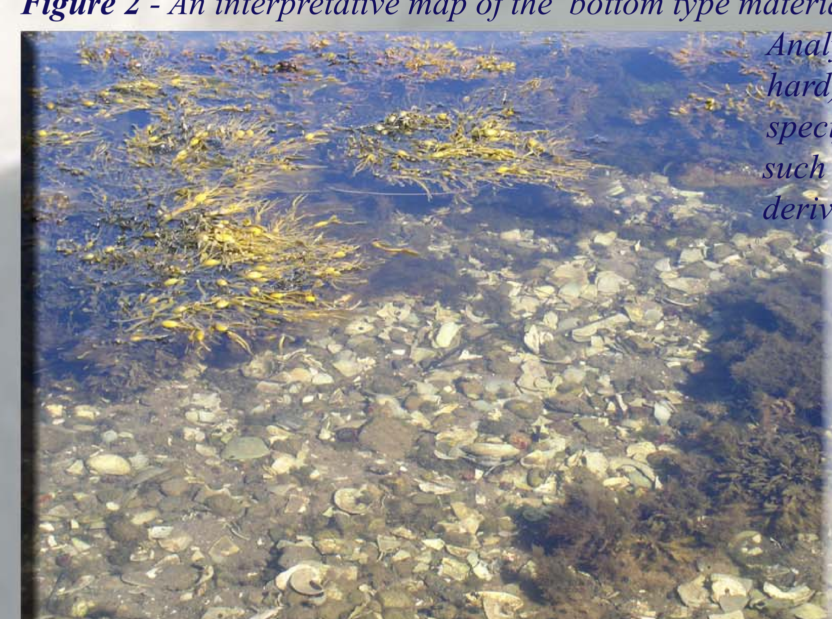
The potential for SAV restoration *(Fig. 4)* **was determined by visual observation of % SAV on different soil mapping units combined with Connecticut DEP 2002 data of known eelgrass beds. Soil mapping units associated with existing dense eelgrass beds were determined to have the best soil properties for SAV establishment and growth. These soil mapping units were rated as high potential for eelgrass restoration throughout the survey regardless of existing eelgrass populations on individual soil mapping units.**

Results and Conclusions

Figure 1 - A map identifying sulfidic materials, which when exposed to air produce sulfuric acid resulting in acid sulfate drainage. Habitat degradation and loss of biodiversity is caused by the release of acid and high concentrations of Fe, Al, Mn into the environment. If buildups of acid or dissolved ions occur, this can be extremely toxic to plants and animals. Development activities in sulfidic materials have resulted in marsh dieback, concrete corrosion and structural subsidence. This information would be beneficial in a coastal hazards atlas and important to SAV habitat restoration.

This map demonstrates the need for merging marine and terrestrial soil data to address coastal zone patterns and processes that cross the land-sea interface.

Figure 2 *- An interpretative map of the bottom type material or n-value of the soil surface layers.*



Analysis of the bottom type (soft or hard) can be used to create species-specific habitat maps. The number of such interpretative maps that can be derived from a soil map is large.

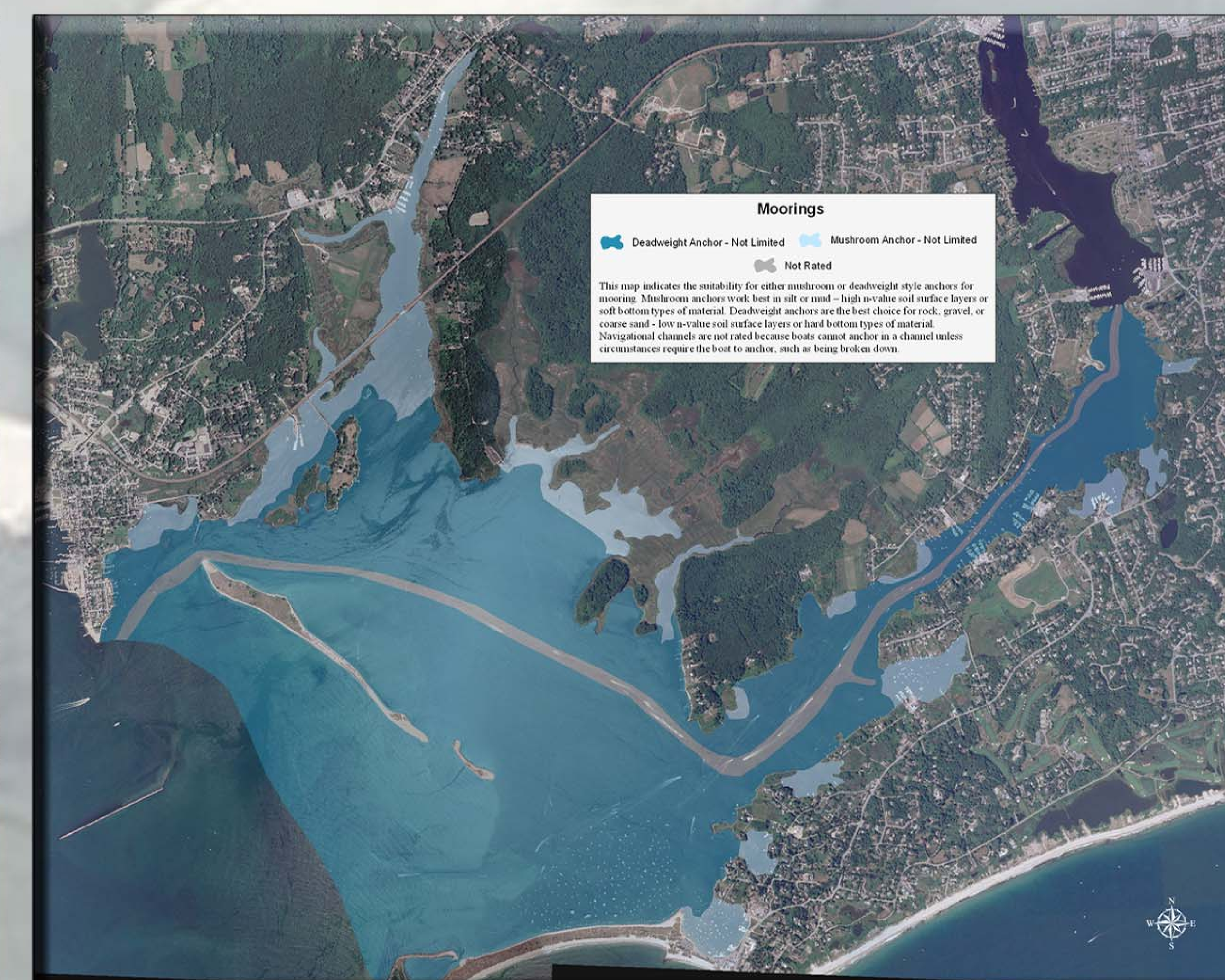
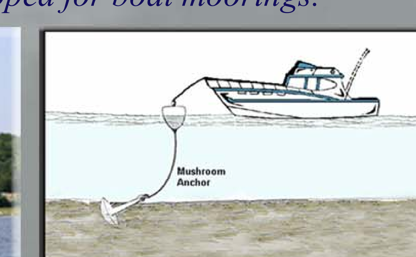
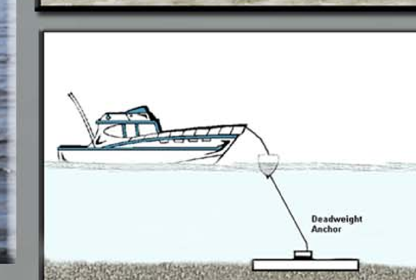


Figure 3 *- A recreational interpretation developed for boat moorings.*





A mooring refers to a structure or anchor used to hold secure a boat in a certain place, with a float or buoy attached. The types of anchors the boat mooring facility may use are influenced by the bottom type or soil surface layers.

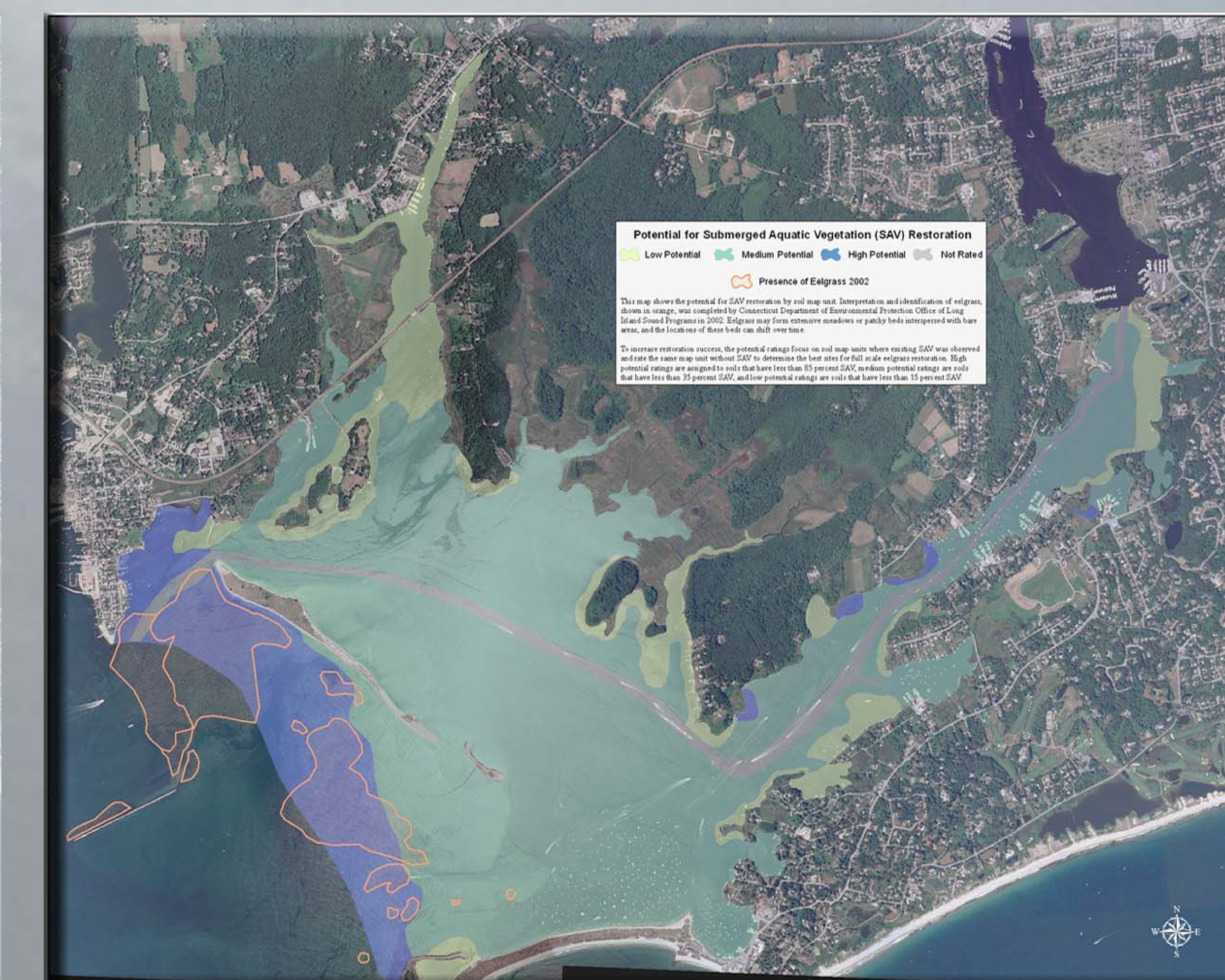


Figure 4 *- A map of the potential for SAV restoration. SAV is a highly important food source and shelter for many species of birds, finfish and shellfish.*

Left, eelgrass habitats are among the most productive and biologically diverse ecosystems on the planet.

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