Project Overview

The Citizen Science: Salinity and Turbidity Monitoring Project is designed to monitor spatial and temporal variations in salinity and turbidity in Little Bay in Rockport Texas. Salinity and turbidity are two of the factors known to impact seagrass proliferation. Seagrass plays an integral role in the productivity and health of the bay. Seagrass density in Little Bay has declined in recent years, prompting studies designed to help elucidate possible causes. For this particular project, volunteers are needed to assist in the collection of field data at a frequency that will capture short-term variability in salinity levels, which can plummet rapidly after rain events and rise markedly in association with prolonged drought events, especially in a semi-enclosed estuary such as Little Bay. Capturing these shifts is essential and cannot be accomplished without the help of dedicated volunteers interested in expanding our knowledge base of Little Bay with the ultimate goal of preserving, protecting, and enhancing the bay for ourselves and generations to come.

Volunteers use a Secchi Disk to gauge turbidity and a refractometer to measure salinity. Wind conditions are measured with an anemometer, and air and water temperature are also recorded. Data is subsequently uploaded to UTMSI/MA-NERR computers by UTMSI staff and made available on-line to the researchers and the general public.

Project Goals

The goal of this project is to provide a record of the long term trends of salinity and turbidity in Little Bay. Since various species of seagrass thrive within certain ranges of salinity and require a certain threshold of light (as measured by turbidity in this study), monitoring long term trends of these two parameters will assist researchers in evaluating their potential effects on seagrass abundance in the bay.

The collaboration among the City of Rockport, UTMSI, Mission Aransas-NERR, and local citizens will bring increased awareness to the general populace of the fragility and changing nature of our natural resources, and help to unite the community in the effort to balance development with preservation of resources.

Background Information

Little Bay in Rockport Texas has been transformed over the past half century from an isolated bay with limited surrounding human habitation to a site which serves as the focal point for recreation and tourism in the general area. To accommodate the growing population, wetlands were drained, canals were dredged, and filling operations were performed. In the process, the physical boundaries of the bay were altered and connections to the more expansive Aransas Bay were reduced. Little Bay is now a semi-enclosed bay, bordered by several hundred homes and condos, a marina, and a beach park.

Over the past 15-20 years, a significant decline in the extent of seagrass beds in Little Bay has been documented by serial, aerial photographs (Coastal Bend Bays and Estuaries Program unpublished). This is concerning because seagrass is considered an indicator species for the ecological health of our bays and estuaries. Seagrass habitats support a biodiverse community and have been likened to the rainforests of the seas. The structural complexity of seagrass, both above ground in its leaf shoots and below ground in the dense amalgam of its roots and rhizomes, provide shelter and potential refuge from predation for a host of organisms. The primary productivity of seagrass creates a food source both directly through its biomass and indirectly through its detrital mass. An acre of seagrass can produce several tons of leaves a year, contributing a high carbon load to the system far exceeding that associated with many land-based crops. In addition to providing trophic support and shelter, seagrass slows currents and baffles the flow of water traversing it resulting in precipitation of particulate matter. Precipitated sediment is then held in place by the root system. In this fashion, additional nutrients are added to the substrata and water in the surrounding area becomes clearer due to lower resuspension of sediments. Rich communities of microscopic organisms colonize seagrass blades and rhizome mats, and passively transported larvae of many species of fish and shellfish settle in seagrass beds. A protective, nutrient enriched habitat is created, supporting a wide diversity of mobile and sessile fauna in various stages of their life cycle.

Recognizing the immense value seagrass provides to Little Bay, researchers from UTMSI, in conjunction with the Aransas County Navigation District, and the City of Rockport have undertaken studies to try and understand and mitigate seagrass decline in the estuary. An abbreviated sample study was performed by Dr. Ken Dunton and associates at the University of Texas Marine Sciences Institute in 2007 for the City of Rockport (Dunton et.al. 2007 unpublished). That study involved measurements of pH, salinity, water temperature, dissolved oxygen, nitrogen levels, total suspended solids, and chlorophyll levels at a single point in time. The study identified several factors (low salinity, high light attenuation coefficient, relatively high ammonium levels) which, in combination, could adversely impact the vigor of the seagrass beds. The utility of the study was limited, however, by its abbreviated nature. In another limited study, Belaire Environmental Inc. was contracted in 2007 to plant and monitor a seagrass bed in

Little Bay. Twelve experimental seagrass plots were planted with *Halodule wrightii,* a submergent halophyte. Disappointingly, out of 1200 plugs planted, a single plug remained after two months (Belaire 2007 unpublished). No definitive explanation for the failure of growth of the seagrass planting was elucidated although Mr. Belaire hypothesized that water quality or silt may have led to the failure (Belaire 2008unpublished). A more comprehensive study evaluating water quality parameters in Little Bay was undertaken by Dr. Dunton and associates (Mission Aransas National Estuarine Research Reserve and University of Texas Marine Sciences Institute) in 2008 and completed in 2010. The study did not identify any specific factor solely responsible for the decline in seagrass in Little Bay. Subsequent monitoring of temperature, salinity, dissolved oxygen, turbidity, and chlorophyll by MA-NERR/UTMSI and reported over 2012 to 2014 in “Little Bay Water Quality Report Cards” has not revealed any consistent pattern suggestive of deteriorating conditions when compared to conditions in the adjoining Aransas Bay.

The current study will complement earlier work. It will concentrate on obtaining a longer term look at two parameters (salinity, turbidity) known to effect seagrass proliferation. With the assistance of citizen scientists we will be able to obtain a more complete record of salinity and light conditions in the bay, allowing researchers to relate the trends uncovered to conditions known to favor seagrass growth.

PROCEDURES

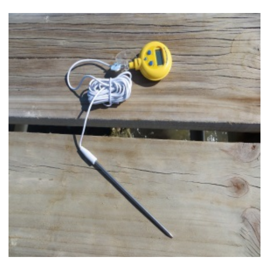
Sample Collection

1. Use a pencil to record date (mm/dd/yy), time (24:00), your initials, and any pertinent notes regarding weather conditions in the yellow field notebook.

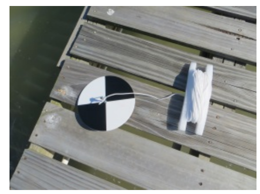
2. Use the anemometer to obtain wind speed (kt), air temperature (^{o}C), barometric pressure (inHg), altitude (m), and record values in the field notebook.

3. Using the precision depth meter, record the depth (m).

4. Turn on and then suspend the probe of the Traceable thermometer in the water and record the temperature displayed (^{o}C).



5. Remove your sunglasses; while keeping track of the half meter marks on the line attached to the Secchi Disk – lower the disk until you are no longer able to distinguish between the black and white quadrants. Record the depth to the nearest half meter. Lower it further until the disk is completely out of site. Raise it slowly until you can just distinguish between the black and white quadrants, take another reading. Repeat this step a total of three times and record the average of the values in the field notebook.



6. Obtain a water sample at mid-water depth (based on your precision depth reading performed earlier) using the water sampler.

7. Remove a subsample of the water from the water sampler using the pipette provided. While holding the barrel of the refractometer parallel to the ground, dispense two drops of the water sample from the pipette onto the sample port of the refractometer. Close the sample port cover – no air bubbles should be visible and the sample should completely fill the sample chamber. Lift the refractometer to your eye while maintaining it in a level plane. Read the scale on the right - adjust the ring at the eyepiece for clarity if the numbers do not appear crisp. This is the salinity reading. Record the number.

8. Rinse all parts of the equipment that contacted salt water with tap water from the squeeze bottle provided. Dry as needed with towel. Return equipment to the designated storage site.

9. Notify project manager by text, e-mail, or phone that data has been collected; this will enable manager to have data transferred to computer for on-line access.

10. Project manager will check the calibration of the refractometer monthly using distilled water in a controlled environment of approximately 20°C. If the blue/white boundary line falls above or below zero, loosen the screw on the calibration ring and turn clockwise or counterclockwise until the boundary line, viewed through the eyepiece, is at zero. Gently tighten the screw. Record calibration check and whether recalibration was required and performed.

SITE INFORMATION

1. Site 1 is located within the Rockport Beach Park. Sampling is to be performed from the dock at the far west end of the boat launch.

2. Site 2 is located along Broadway. Permission has been obtained to use the "Little Bay Club Pier". Samples are to be obtained at approximately the mid-point of the pier on the south side looking back towards the Beach Park.