Study of the Physical Parameters of The Beach Haven Sand Ridge Area
Using The Autonomous Underwater Vehicle

REMUS
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Abstract- Developing an understanding of the oceans physical aspects is very important. The ocean’s physical parameters can provide us with an understanding of marine habitats, how they formed, and also allow us to make predictions as to what will happen to them. This information is useful to fisheries management. It can help explain why certain species are attracted to specific areas. The physical parameters that are observed can be broken into specific aspects such as physical and physiochemical. Physical aspects are exploring features such as bottom topography, bathymetry, and currents etc. The physiochemical is the salinity, suspended material, temperature at the observed areas. Traditionally oceanographic data was collected manually through techniques that involve humans attending equipment from the surface. But as of recent there has been a development of technology known as Remote Operated Vehicles (ROV) or Autonomous Underwater Vehicles (AUV). AUV’s are excellent for collecting data because they operate with out constant supervision and human interference. AUV’s can also perform multi-tasking at once. The Remote Environmental Measuring UnitS (REMUS) was used to collect data. REMUS possesses the ability to collect physiochemical data and is also capable of taking side scan imagery photos, bathymetric data during a single mission. Once the data is collected it can be compiled and graphed for interpretation.

Methods and Procedures- REMUS (Remote Environmental Measuring UnitS) was used to create a side scan mosaic of stations LE and TOP. This information will allow us to make observations about the physical features of an area that might contribute to the species diversity observed in Otter trawl surveys.

REMUS navigates a series of parallel transects over the stations LE and TOP. During the parallel transects REMUS performed a side scan survey recording the bottom information. This parallel pattern is referred to as mowing the grass.

REMUS was used to record bottom bathymetry and current velocities and directions using the upward and downward looking ADCP. The amount of suspended material in the water column was obtained using REMUS’s Optical Backscatter Sensor (OBS) mounted on REMUS. In addition, Conductivity, Temperature, and Depth (CTD) data were collected using an Ocean Systems CTD (OS200) sensor installed on the REMUS vehicle.

After the side scan survey was performed at stations LE and TOP. REMUS was used to gather physiochemical data as was described above for the other trawl stations LE, OTS, and STAC.

Discussion and conclusion- Figures 4a and 4b are plots of the OBS data with reference to Longitude. Depth is plotted on the secondary axis. The OBS data indicates that there is a great difference in the turbidity between the stations. The value at LE was 100 NTU’s while values at TOP were around 41.7 NTU’s. Since the OBS values are measurements of suspended material in the water column, it may also indicate a resuspension of nutrients offering a potential reason for the variation in species amount and Diversity observed in fig 2. The resuspension of nutrients would attract smaller species of aquatic life and in turn attract larger species to feed upon the smaller ones. More extensive water testing would be required to prove this but with REMUS it is possible to get broad data that can provide ideas as to what might be the explanations for the trawl surveys results.

Figures 3a and 3b are the snapshots from the side scan mosaics developed for stations LE and TOP. The snapshots of the bottom structure at LE has topographic variation where as TOP is predominately sand. TOP’s snapshot shows strong ripples which indicate that it is a high energy area due to wave effect. These sand ridges show us that there is little protection for marine life.

The side scan imagery indicates lots of structure at station LE. Since there was no groundtruthing involved in this project, it is difficult to determine the nature of these structures. It is believed however that some of the “mounds” or sudden changes or ripples are polychaete worm mounds. These worm mounds are a food source to fishes. If these are indeed polychaete worm mounds they would attract fishes to the area.

Figures 5 and 6 are plots of the salinity with reference to longitude. Temperature and pressure were being plotted on a secondary axis for the stations LE and TOP. The bottom salinity at station LE was 31.84ppt and station TOP is 31.86ppt. These salinity differences are insignificant and not a factor in the diversity and abundance observed between the stations.

Data collected during this project seems to indicate that the resuspension of materials and the bottom structure may be the main reasons for the diversity and abundance of species observed in Fig 2.