Benthic Habitat Mapping in Plymouth Sound

Group 3 Geophysical Survey

Introduction

There are two main approaches to habitat mapping. Firstly, a preliminary study may be conducted on a site that has not been mapped previously. This approach is known as prospecting and is both costly and time consuming due to the level of detail required to produce a good quality baseline of the area. Secondly, an area that has previously been mapped can be revisited and new maps can be compared to older examples in order to identify any changes in the environment. Ideally habitat mapping would take place at least once a month in special interest zones such as this as the Plymouth Sound has been proposed as a Special Area of Conservation (SAC) [1]. However, there are protected seagrass beds in the Plymouth Sound that have not been surveyed since 2012.

Group 3 set out on the Echo Explorer to perform a geophysical survey and habitat map of a small area to the West of the Plymouth Sound, using Sidescan Sonar technology and ground truthing techniques. This area was selected as it had not been previously mapped by other groups and was likely to contain areas of softer sediment.

Methodology

Three 2km transects were plotted 100m apart for the vessel to follow. The Sidescan Sonar is a multibeam sonar with 100kHz frequency, 65m track range either side of the towfish and was used to obtain an image of the seafloor. However, the port side would not be clear due to electrical disturbance. The Sidescan image enabled the group to identify any areas of soft sediment that would be suitable to perform ground truthing techniques using both video and Van Veen grab sampling, as grabs should not be done on rocky areas of the seafloor. One fly over transect video was performed followed by two Van Veen grabs, each in separate locations.

Sidescan Sonar Mosaic Analysis

Three different zones were identified in the area. Different sediment types reflect the backscatter differently, with the darkest points showing harder and more reflective substrates such as rock, and lighter points represent the softer sediments such as muds.

Throughout all three transects, there are substantial areas of both soft and hard sediment. In some cases, large rocks can be seen on the seafloor on top of a soft sediment location.

This was also supported by the deployment of the ground truthing techniques, which showed soft silty sediments on the seafloor. When analysing the mosaic images there are a couple caveats to bear in mind. Boat wakes will produce bubbles in the water column which will reflect the sonar beam and therefore disturb the image produced, which can be seen in Transect 5 at 09:36 UTC. Shoals of fish, boat sonars and fixed structures like moorings will also cause unusual disturbances on the trace.

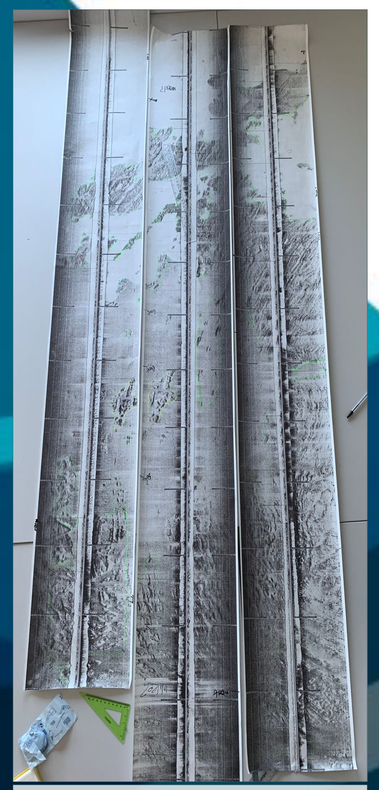

Fig 1. Sidescan Sonar mosaic consisting of transects 4, 5 and 6 from left to right, with highlighted features.

Fly Over Transect Video

The fly over video showed two sand gobies (Fig 2 A), *Pomatoschistus minutus* (Pallas, 1770), however nothing else was observed. This may be due to the boat frightening organisms, causing them to flee.

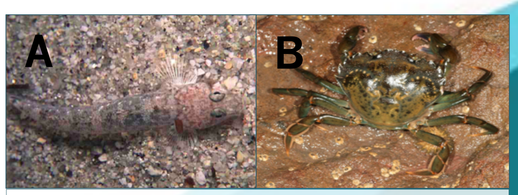

Fig 2 A. Sand goby, *Pomatoschistus minutus* (Pallas, 1770). Charlotte Johnston Copyright: Joint Nature Conservation Committee (JNCC) [2]. **B.** Shore crab, *Carcinus maenas* (Linnaeus, 1758). Malcolm Storey Copyright [3].

Grab Sites 1 & 2

Grab	1	2
Date	05/07/19	05/07/19
Time	1021 UTC	1030 UTC
Location	050°20.103N 004°11.032W	030°20.129N 004°11.127W
Depth	4.15m	3.99m

As the two grab sites were so close together, both sites were composed of find sandy mud with a very fine particle size. The diversity of both grabs was poor, with only one small green shore crab (Fig 2 B), *Carcinus maenus* (Linnaeus, 1758) found in grab site 1 and nothing was seen in grab site 2. However, organisms may have been missed as the sediment was very thick and dark in colour and many organisms were extremely small.

Trace Map & 3D Contour Plot

A trace map was created using the northings and eastings collected from the side scan traces (Fig 3 A). The time was overlaid onto the trace to produce a clear outline of where and when the transects were performed. The main features and sediment types identified from the Sidescan mosaic were illustrated on the trace in different colours.

Surfer 8 was used to produce the 3D contour plot (Fig 3 B), which illustrates the 3-Dimensional nature of the seafloor.

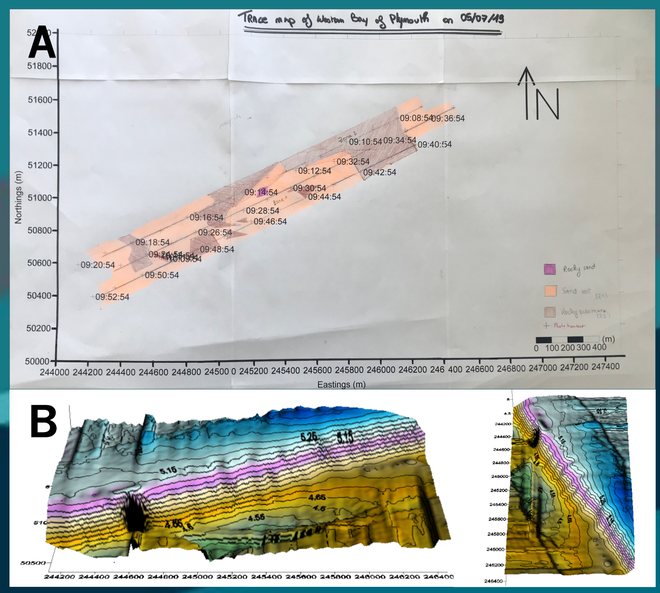

Fig 3 A. Trace map produced from Sidescan data. Also showing colour coded main features of sediment surface. **B.** 3-Dimensional representation of the area covered by the Sidescan Sonar traces.

References

[1] UKMPA (2001) *Plymouth Sound and Estuaries European Marine Site: Case History*. [Accessed: 09/07/19] Available at: < http://www.ukmarinesac.org.uk/pdfs/casestudy-plymouth.pdf >

[2] Johnston, C. (n.d.) Sand goby (*Pomatoschistus minutus*). Joint Nature Conservation Committee. [Accessed: 09/07/19] Available at: < https://www.marlin.ac.uk/assets/images/marlin/species/web/o_pommin.jpg >

[3] Storey, M. (n.d.) Green Shore Crab *(Carcinus maenas)*. Discover Life. [Accessed: 09/07/19] Available at: < https://www.discoverlife.org/IM/I_MWS/0774/320/Carcinus_maenas,I_MWS77495.jpg >