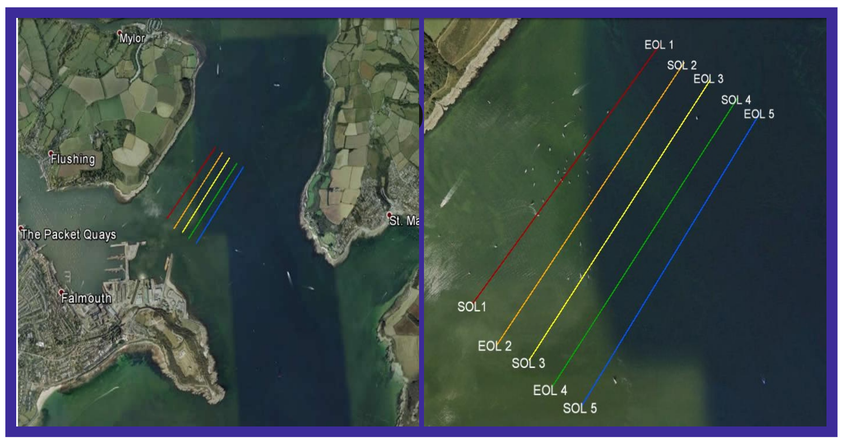
GROUP 5 - GEOPHYSICS SURVEY AND BENTHIC HABITAT IDENTIFICATION

Survey Date: 02/07/2014
50° 09.606N'
005° 03.171W'
Time Period: 07:10 UTC – 10:15 UTC
Tidal state: LW – 02:14 UTC (1.10m)
HW – 08:02 UTC (4.60m)
LW – 14:22 UTC (1.20m)
HW – 20:12 UTC (4.70m)

INTRODUCTION

Seabed and bedform mapping with the use of side scans and underwater cameras is very important for understanding and locating certain marine habitats which necessitate protection. The fal estuary is of particular importance due to the maerl beds, which are now critically endangered. Maerl requires very specific conditions to grow and grows at a very slow rate of 1mm per year. Dredging ceased in 2004 in falmouth. Our aim was to evaluate bed forms and therefore the habitats and biodiversity of our transect. Our area of observations was of particular importance due to plans of dredging and deepening the harbour entrance so that larger ships can enter the harbour.



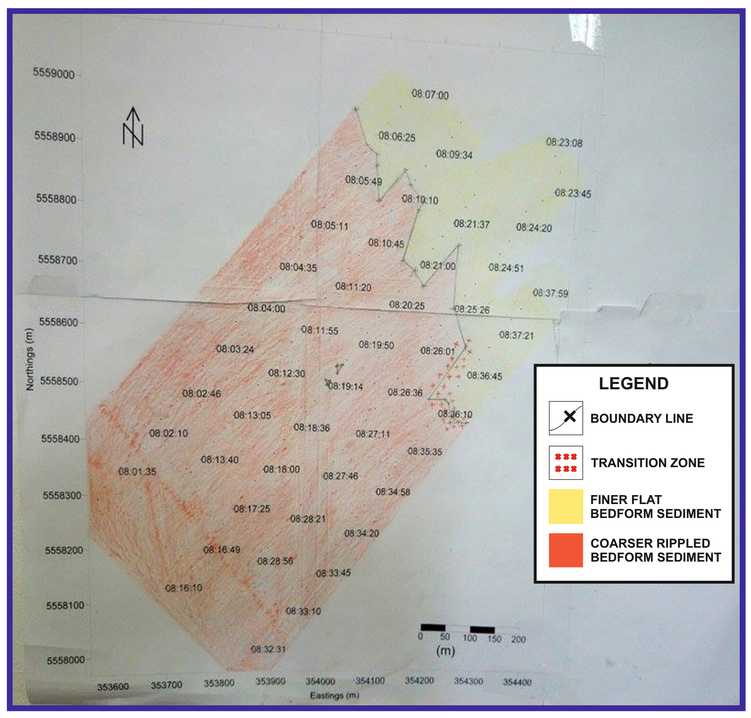
METHODS AND EQUIPMENT

Equipment used: sidescan sonar, underwater camera
Weather conditions: sunny, cloud cover 1/8, some swell.
Latitude and longitude projected to grid eastings and northings using UTM

A towfish with a side-scan sonar towed from the M.T.S Explorer was used to map the bathymetry of Falmouth Harbour. 5 transects were sampled 100m apart at the mouth of the harbour. A print-out of the side-scan transects was processed To determine bathymetric features present, different bedforms and sediments were then distinguished back in the lab with the help of underwater footage. A video camera was also towed separately behind the boat whilst drifting over the already side scanned seabed; To identify both species present and confirm bathymetric features. The variable sonar layback was 5.5m and the static sonar layback was 12.52m behind the GPS.
This was taken into consideration when writing the results.

Line Number	Time (AST)	Eastings	Northings
1 – Start	0801	353574.52E	5558305.00N
1 – End	0807	354161.13E	5559030.21N
2 – Start	0809	354233.45E	5558963.08N
2 – End	0814	353643.64E	5558211.04N
3 – Start	0816	353739.61E	5558160.05N
3 – End	0822	354315.13E	5558917.99N
4 – Start	0823	354388.22E	5558401.59N
4 – End	0829	353805.75E	5558087.34N
5 – Start	0832	353885.71E	5558044.34N
5 – End	0839	354473.41E	5558794.20N

Video Label	Record Time Start (AST)	Position in water	Position out of water	Record Time end (AST)
1	0849	354,220.78 E	353,687.01 E	0928
		5,558,377.22N	5,558,379.73N	
2	0934	354,193.80 E	353,940.00 E	0950
		5,558,579 N	5,558,486.16 N	



GEOPHYSICS MAP DESCRIPTION

Boundary Line - The sidescan transects taken together as a whole indicate an overall boundary in sediment type occurring along the general boundary line indicated on the track plot and this highlights bifurcation between the two bedform types.

Flat Bedform - The area coloured in yellow had overall finer appearing sediments than that in orange and the sediment was overall flat with no ripples or other significant features observed.

Transition Zone - The transition zone indicates an area where the distinction between rippled and flat sediments is less obvious. Analysis of the sidescan sonar maps helped to identify the smaller and less defined ripples that formed the transitional zone; with an average ripple height of 0.14m and an average ripple wavelength of 0.59m.

Rippled Bedform - The area coloured in orange indicates an overall area where there are clear ripple formations on the sediment. In order to ensure that these were clearly distinct from the ripples in the transitional zone, the sidescan sonar maps were again analysed and the average ripple height measured was 0.23m and the average ripple wavelength was 1.47m. There were also observed small areas of what appeared to be finer sediment contained within the coarser sediment area which could have been due to interference with the sediment from either man made or natural sources or simply due to an artefact of the sidescan sonar map.

BENTHIC IDENTIFICATION

FIG. 1 shows change in bedforms on the sea floor. The image to the left shows an area where the seabed is flat and current speed is lower. The image to the right shows an area where ripples dominate and current speed is higher. The majority of the sea floor seen on the video has similar bedforms to those seen on the right. In the rippled areas fauna and flora tend to live in the troughs of each ripple.

FIG. 2 shows some of the benthic macrofauna living in the sampled area. this includes the Edible Crab (*Cancer pagurus*), Sand Goby (*Pomatoschistus minutus*), Common Starfish (*Asterias rubens*) and a Dogfish (*Scyliorhinus canicula*). Fauna also seen but not pictured include the Common Hermit Crab (*Pagurus bernhardus*) and the Green Shore Crab (*Carcinus maenas*).

FIG. 3 shows a Thornback Ray (*Raja clavata*) found living in a relatively flat area. Thornbacks are common all around the UK, found on sedimentary seabeds, often in close proximity to their prey which include small crustaceans.

FIG. 4 shows a variety of flora found in the sampled area. The top image shows Landlady's Wig (*Desmarestia aculeata*) with *Ceramium Virgatum* using the Landlady's Wig as a substratum for growth. *C. virgatum* is often found growing on seaweed species around the UK. The bottom image shows Sugar Kelp (*Saccharina latissima*) with *Obelia geniculata* growing on it.

DISCUSSION

The overall boundary between rippled bedforms and flat bedforms that is typical to the survey area is most likely a function of current strength. A possible explanation that accounts for this difference in ripple formation could be due to the water depth above the sediment. In the section with ripples, the water column was shallower than the section that was flat. As the water gets deeper, the current flow reduces to a point where the formation of ripples no longer occurs.
The ripples observed were fairly well established as algae grew in the troughs of the ripples and said algae existed in great variety. Associated with this flora was a variety of fauna as was described. This likely meant that the ripples were primarily current-driven rather than the more temporary and changeable wave-formed ripples.
The survey had a few limitations that made interpretation of the data and drawing eventual conclusions troublesome. Firstly, the sidescan sonar maps can be unreliable and can be misinterpreted; areas that appear featureless when surveyed from one side revealing features when surveyed from the other and sonar artefacts showing nothing at all appearing as real and imminent features. Additionally, the area surveyed was a special area of conservation and so grabs could not be conducted. This meant that the grain size of sediments could only be defined in relative terms (i.e. 'finer' and 'coarser') rather than against an objective scale.