

Geophysical Benthic Habitat Mapping of Saint Anthony's Head, Fal Estuary

Aims and Introduction

The aim of the boat investigation was to carry out a geophysical survey of an area of the Fal estuary using several different methods such as side scan sonar, video recording and grab trawls, in order to create a benthic habitat map.

The survey was carried out in the lower Fal estuary at Saint Anthony's Head. This is part of Special Area of Conservation (SAC) as it has several different substrates which provide different habitats for many different marine species. (<http://jncc.defra.gov.uk/protectedsites/sacselection/sac.asp?EUCode=UK0013112>). Some examples of these habitats include 1736ha of sub-tidal environments, 653ha of intertidal mudflat environments and 93ha of saltmarsh environments (<https://projects.exeter.ac.uk/geomincentre/estuary/Main/loc.htm>).

The estuary is a drowned river valley which was formed at the end of the last ice age as the glaciers melted. It has a carboniferous rock catchment which is of Devonian age.

In the past the estuary has been affected by pollution from mines, agriculture, and sewerage works all of which could have had an effect on the benthic habitats.

Meta Data

Date: 25/06/2014

Time: 08:00 - 12:00

Location: 50° 08.981N

005° 01.066W

High Tide: 04:35 UTC, 16:58 UTC

Low Tide: 11:16 UTC, 23:42 UTC

Wind: South westerly, 11Knots

Sea state: Large swell

Cloud cover: 7/8

Vessel: MTS Xplorer

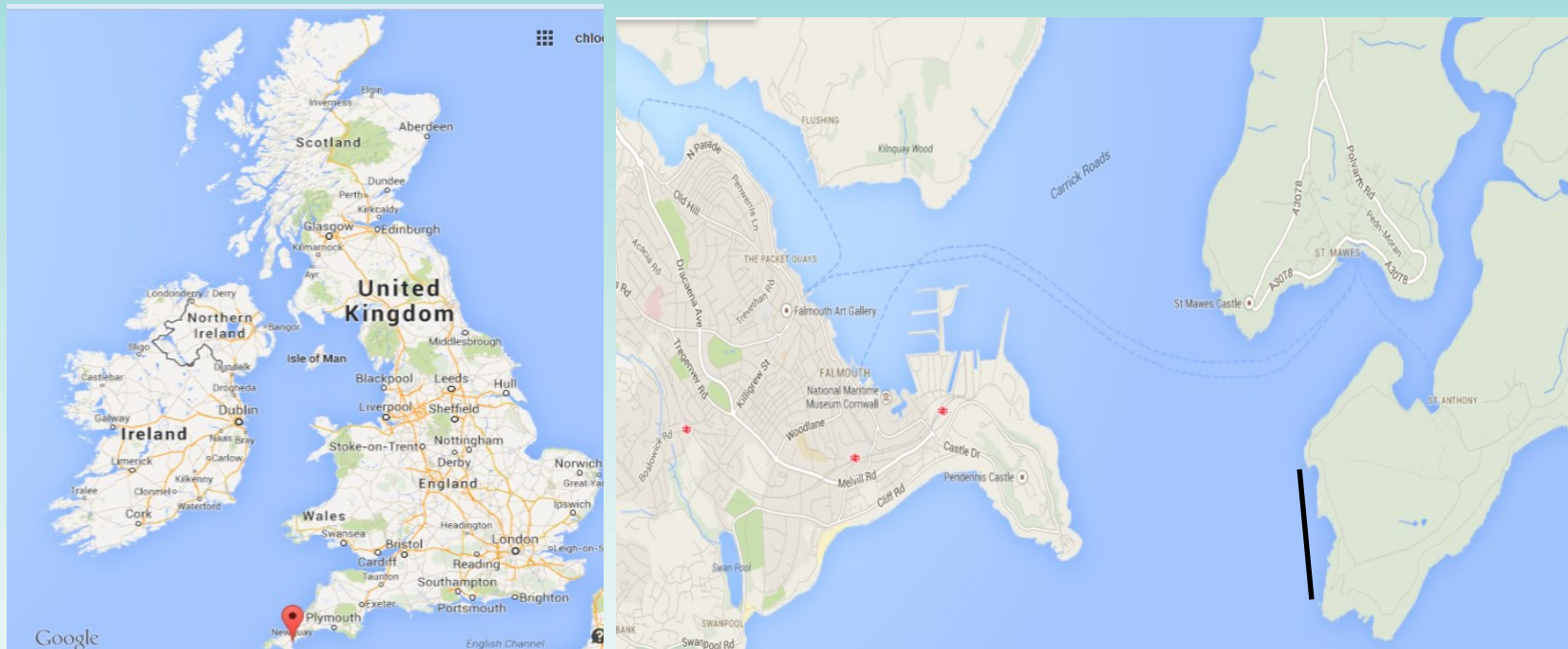


Figure 1- Location of Falmouth in UK

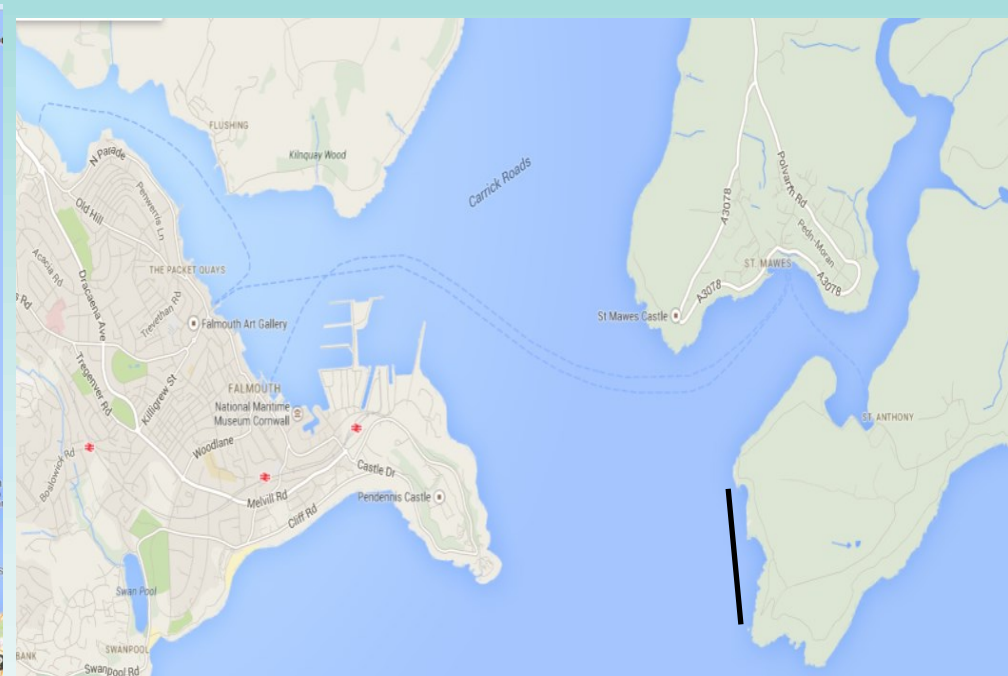


Figure 2- Transect locations within the Fal estuary

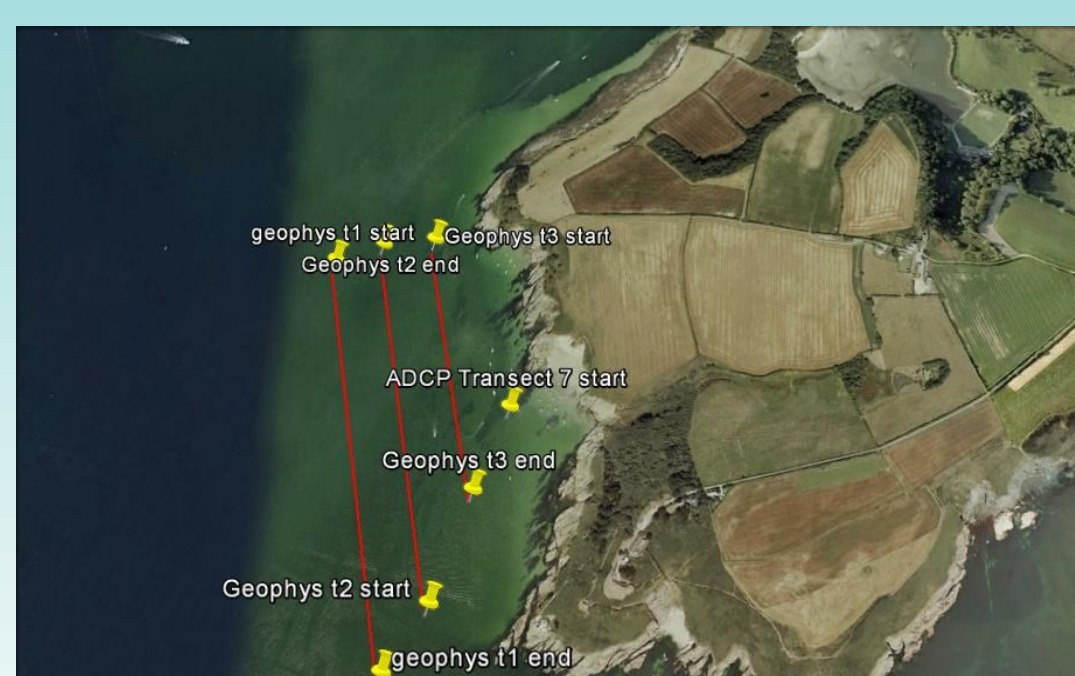


Figure 3- Exact location of the three transect routes followed

Methodology

The survey was carried out of 25/6/14 between 07:00 UTC and 11:00 UTC.

Using hydropro software, four transect lines were plotted, each 100m apart, in the area around Saint Anthony's Head. This area was selected as it is less than twenty meters deep so it could be surveyed by video. Side scan sonar, with a 75m swath, was also used. Due to the special area of conservation designation it was not possible to collect any grabs.

In the lab analysis the side scan trace and video footage were used to create a habitat map. The video footage was also used to identify species and confirm the presence of different substrates.

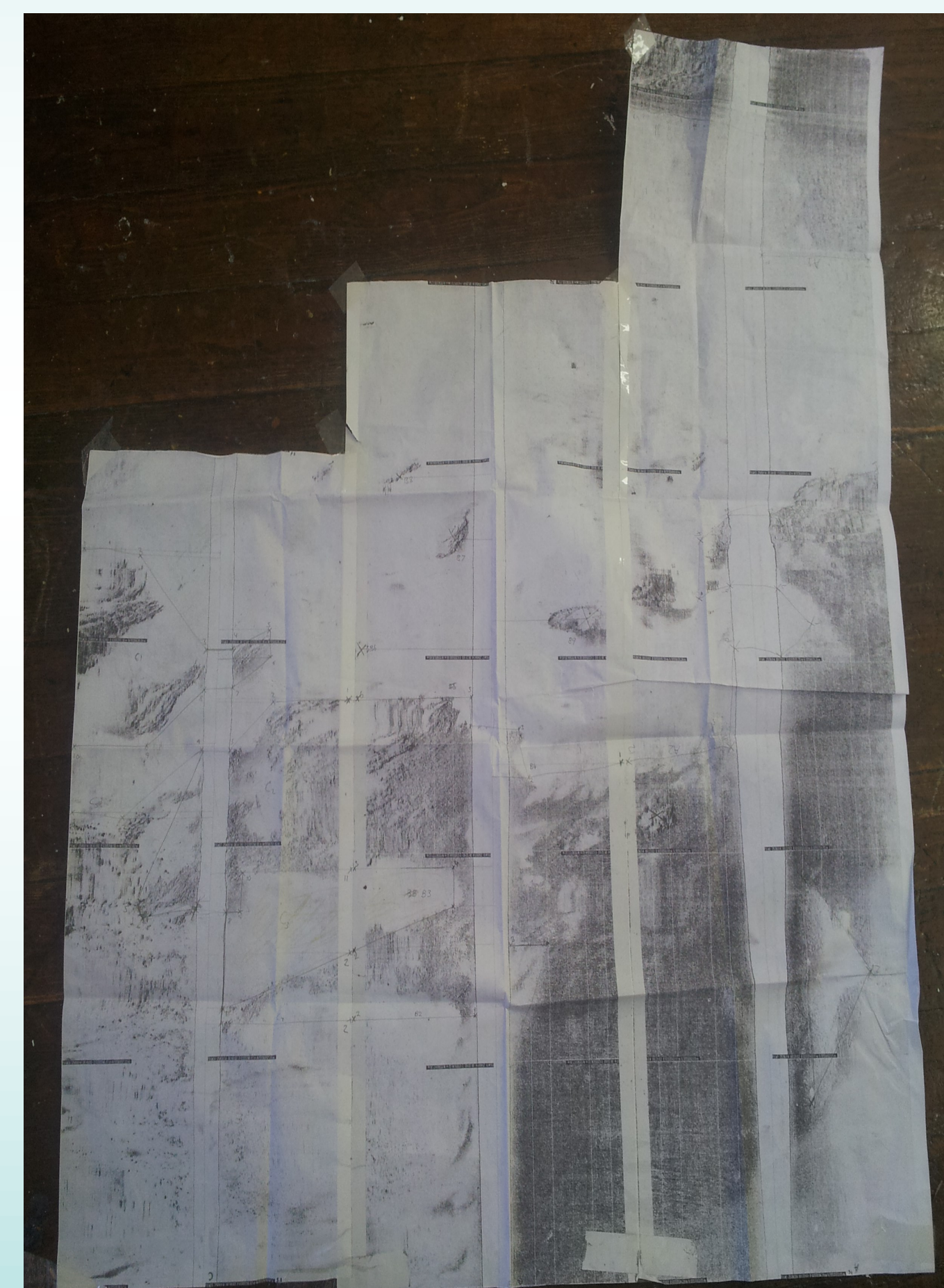


Figure 6- Side scan trace

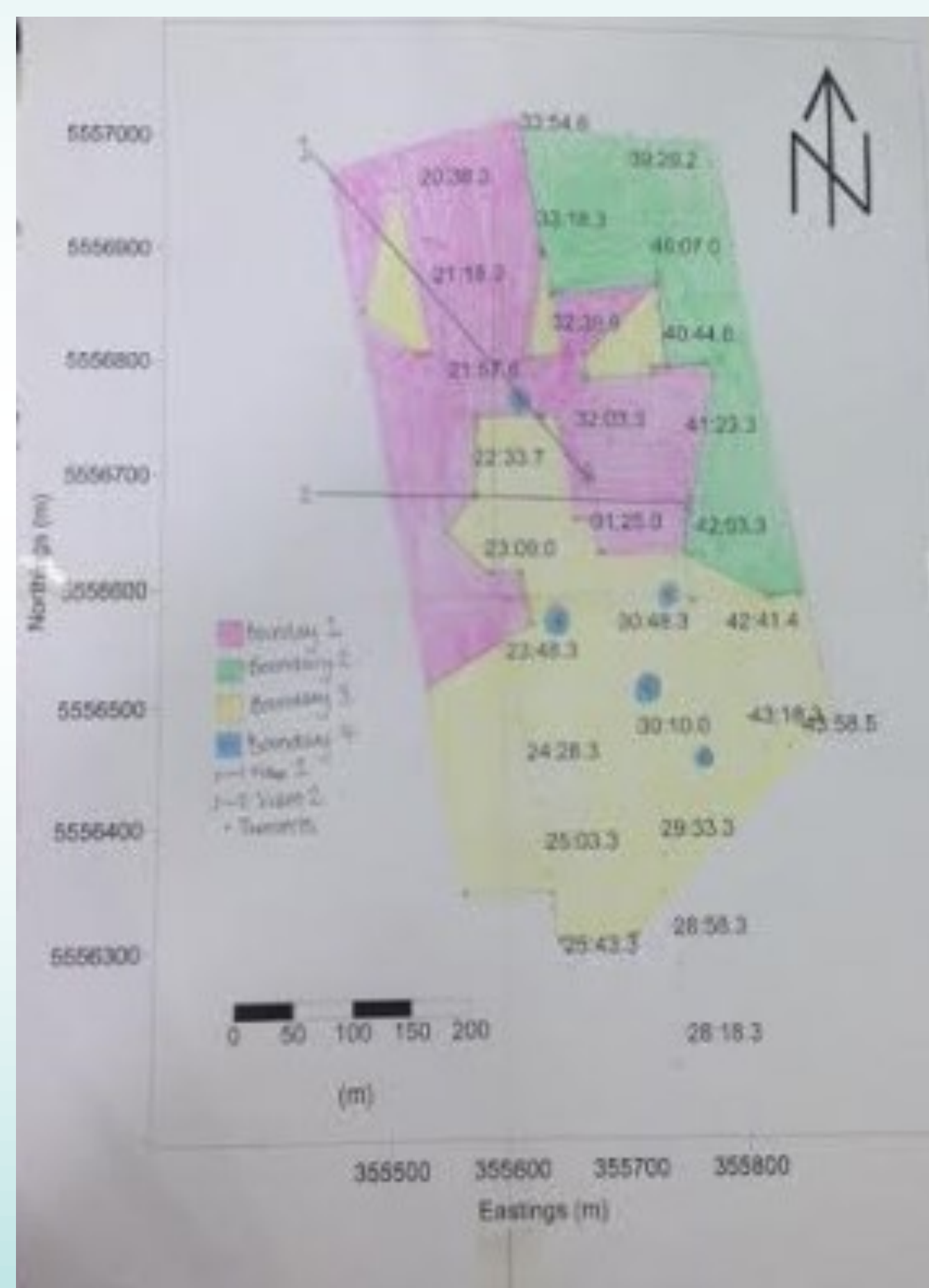


Figure 7- Habitat Map

Boundary 1— This zone is predominantly coarse sediment with an outcrop of harder substrate, which is indicated by a darker area on the side scan trace. Evidence from the video footage suggested that the coarse sediment could possibly be made up of shell and maerl fragments.

Boundary 2— The side scan trace shows that this zone consists mainly of seaweed which has a patchy distribution.

Boundary 3— This zone is made up of fine sediment, shown by the lighter tone on the trace as there is less backscatter. There are also patches of fine sediment present within the other

Boundary 4— This is made up of patchy outcrops of rock within the different boundaries. They are shown by darker tones as there is stronger back scatter to the tow fish.

Discussion and Conclusion

The side scan trace produced a useful data set which when combined with the video footage has given us a clear picture of the habitat in the area sampled allowing us to produce a habitat map and enable us to understand the sea floor as a benthic habitat.

We found there to be rocky outcrops throughout the boundaries which may be present due to the fact that the estuary is part of a rocky shoreline. It also has sediment banks, which are shown by the extensive areas of finer sediments on the side scan trace. These sediment banks are formed as there are high siltation rates and slow tidal flows which result in deposition (http://jncc.defra.gov.uk/pdf/pub98_mncr_benthicmarine_pt2_ch8.pdf). Furthermore, although the Fal Estuary is known for maerl, we found little evidence of any from our survey.

The kelp forests were identified from both the side scan trace and from the video footage. This habitat is typical of shallow, rocky shorelines. These beds may also be a contributor to the special area of conservation designation of the area as kelp beds have a high diversity of organisms.

From the video survey we were able to identify a number of species. However, a limitation of this method is that the video quality is not always that high as it may be blurry or obscured due to poor visibility in the water column. Another limitation of this method is that we surveyed quite extensive areas of flat sandy sediments which are likely to be home to burrowing invertebrates and as a result these would not be picked up by the video camera. This is where the ability to have done a grab sample would have been particularly beneficial. Furthermore, the kelp beds provide a habitat for species to hide in and so may also mean that species were missed from the video footage.

A limitation of our survey was that the water became too shallow and rocky near the shore so the fourth planned transect line could not be completed. In addition, the fact that we could not carry out a grab meant that we were unable to confirm any of the evidence from the side scan trace or video footage with physical evidence. The video transect was also limiting as it only covered a small area compared to that covered by the side scan sonar. As a result of this it was not possible to confirm all the inferences made from the side scan trace with evidence from the video footage. Finally, on the third transect line, the boat deviated from the planned course due to a yacht being on a collision course. This resulted in overlap in the side scan trace with the adjacent transect line due to the swath width of 75m and only 100m separation between transects.



Figure 8- Screen shot from video transect showing patchy seaweed distribution



Figure 4- Screen shot from video transect showing finer sand substrate with patchy seaweed and *Asterias rubens*



Figure 5- Screen shot from video transect showing coarser sand substrate with broken shells and patchy seaweed distribution. There is also a Thamback Ray.



Figure 9- Screen shot from video transect showing fine sediment substrate

Observations from Video One

Bryozoans, *Marthasterias glacialis*, *Pectinidae*, *Ulva*, *Laminariales*, *Lithothamnion* and *Asterias rubens*

Observations from Video Two

Laminariales, *Ulva*, *Scorpaenidae*, *Labrus bergylta*, *Asterias rubens*, *Mathasterias glacialis*, Thamback ray and Sole.

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References

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