

Geophysical Habitat Mapping in the Fal Estuary

The Fal Estuary

The Fal and Helford area is classified as a Special Area of Conservation, as it contains several features of interest listed by the EU habitats Directive. The features of interest in the Fal system include estuaries, intertidal mudflats, salt marshes, reefs, subtidal sandbanks and large shallow inlets and bays- of particular importance are the maerl and eel grass beds which are endangered and act as nursery grounds for other species¹. The Fal estuary is a ria, that until 1991 was largely affected by metal pollution from mining- another reason for its conservation³.

As it is an SAC it is important to map the habitats in the Fal area in order to monitor substrates and species that are being protected, and to give information as to how the habitats change over time and what further measures may need to be put in place.

The aim of the survey was to obtain data on the species and substrate present off Falmouth Bay around the Swanpool area (50° 08'6"N, 005°03'9"W to 50°08'21"N, 005°03'00"W) in order to classify and map the habitat.



Figure 1: Aerial view of sampling Site 10 which correlates with the Ship track in Fig. 2

Methods

- Data were collected on 05/07/17 between 13:00 UTC and 16:00 UTC.
- Subsurface dual frequency analogue Side Scan Sonar was used to remotely map the seafloor along three different transects (Figure 2) at a frequency of 100kHz. This was then used to determine habitat boundaries within the area.
- A map of the transect paths was generated on Surfer6, which the data from the sidescan sonar was then transferred onto to determine habitat boundaries using the time stamps (Figure 2).
- One Van Veen grab was taken to determine the biota present, the sample was processed by sieving through a 2mm and then a 1mm sieve. The grab sample was sub sampled twice and the rest of the sample discarded.
- One 15 minute video of the habitat was taken on a drop down camera going across the three transects (Figure 2).

Results

- Using the Sidescan Sonar data displayed in Figure 2, the area was determined to be homogenous, apart from two very small areas of rock outcrop 10m in diameter.
- Large ripples were evident of 2.7m wavelength throughout the habitat, and from the video footage, the habitat was classified as a subtidal sandbank with mixed sediment community. Sediment observed was coarse grained sand interspersed with bits of broken shell.
- The biota shown in the video footage was sparse, with a single fish of the family *Bleniidae* identified. Several families of macro algae were present in low density, that tended to congregate in the troughs of the ripple- a lot of debris also accumulated in the troughs.
- Results of the Van Veen Grab confirmed the video evidence, as the sample (Figure 3) contained mixed sediment consisting primarily of dead maerl, fragmented dead shells and coarse sand with particle size of 2mm.
- The abundance of organisms collected from the grab was low (Table 1), and the organisms were typical of mixed sediment subtidal sandbanks communities and thus confirm the classification of the habitat.

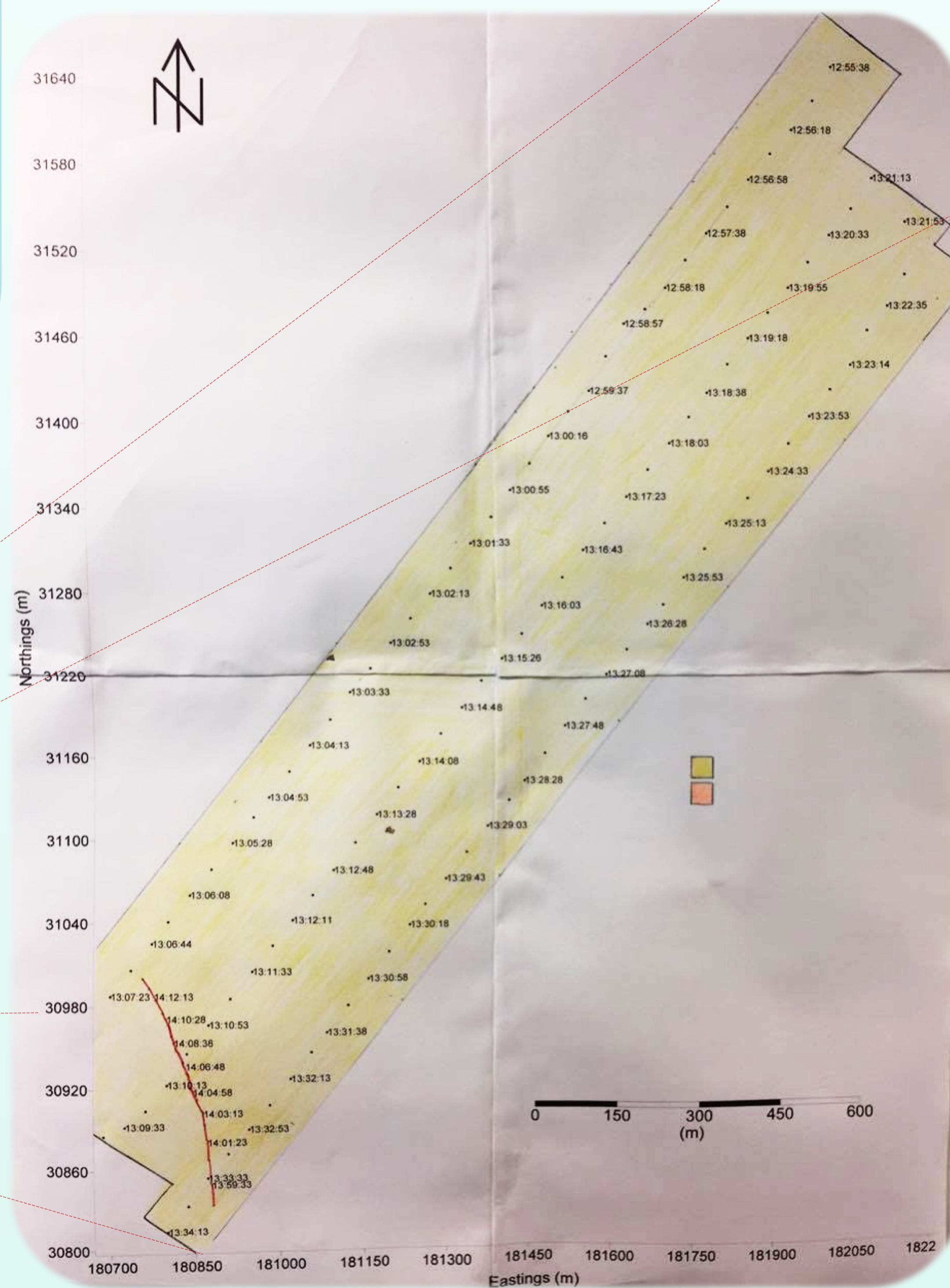


Figure 2: Ship track habitat map of the three transects (Start position 1: 50°08'6"N, 005°03'9"W, 2: 50°08'02"N, 005°04'01"W, 3: 50°05'04"N, 005°05'88"W). Yellow indicates sand substrate and orange indicates rock substrate. Red line indicates the track of the video camera taken.



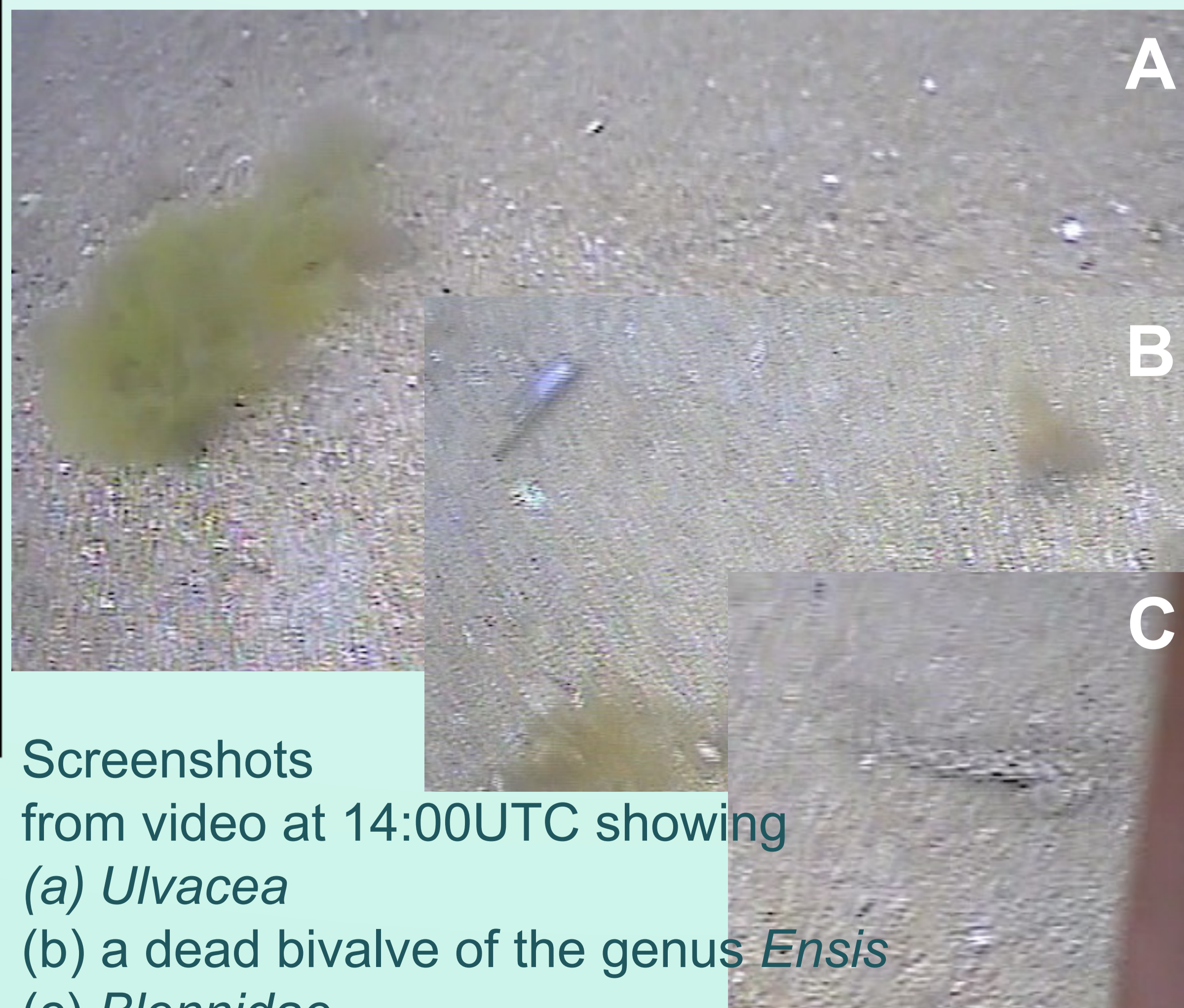
Figure 3: Photo of initial sample obtained from the Van Veen grab.

Discussion

- Our classification corresponds with previous habitat maps of the area¹. The presence of live bivalves and polychaetes in the area suggests that the area is well oxygenated, however both the video footage and the grab revealed that the habitat was largely devoid of life.
- Moreover, the formation of the large ripples from coarse grains (>1mm) suggests that they formed in a storm event due to the high energy required to move the larger grains², and the biota and debris congregating in the troughs of the ripples suggests that perhaps they are relict as the organisms have had time to congregate.
- Results from the grab should be treated with caution as repeat grabs were not completed due to time constraints, and so the results are perhaps not representative of the area.

Taxa	Number of individuals found
<i>Turritella</i>	1 alive, 4 dead
<i>Tellinidae</i>	1 alive
<i>Lucinidae</i>	1 alive
<i>Nephtyidae</i>	1 alive

Table 1: List of species found in the Van Veen Grab sample taken at 14:28 UTC 05/07/17, 50°138'N, 005°069'W, at 11.5m depth



Screenshots from video at 14:00UTC showing (a) *Ulvacea* (b) a dead bivalve of the genus *Ensis* (c) *Blennidae*



References

1. McLeod, CR, Yeo, M, Brown, AE, Burn, AJ, Hopkins, JJ, & Way, SF (eds.) (2005) The Habitats Directive: selection of Special Areas of Conservation in the UK. 2nd edn. Joint Nature Conservation Committee, Peterborough.
 2. Li, M., Sherwood, C. and Hill, P. (2012). Sediments, morphology, and sedimentary processes on continental shelves. Chichester [England]: IAS, p.220.
 3. Langston, W., Chesman, B., Burt, G., Taylor, M., Covey, R., Cunningham, N., Jonas, P. and Hawkins, S. (2006). Characterisation of the European Marine Sites in South West England: The Fal and Helford Candidate Special Area of Conservation (cSAC). Hydrobiologia, 555(1), pp.321-333.