Habitat Mapping in Falmouth Estuary 2013: Group 6

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Introduction

Falmouth Estuary is an area protected by the Special Area of Conservation (SAC). It has been set up in order to provide a strong and healthy habitat for the species that may live and thrive amongst it. The SAC is maintained by the cooperation between authorities, landowners, industry and public users of the specific area. Falmouth, and its surrounding areas, have a rich ecosystem both above and below the water which makes the area a site of Special Scientific Interest. Falmouth meets the requirements to be classed as a SAC due to the following habitats found within the area:

- Saltmarsh e.g. top of Falmouth & Ruan Creeks at Ruan Lanihorne.
- Intertidal mudflats e.g. upper reaches of Polwheveral and Frenchman's Creeks.
- Sub-tidal sandbanks e.g. maerl beds in the Falmouth Estuary, particularly the live bed on St. Mawes Bank.
- Large shallow inlets and bays e.g. the whole bay from Manacle Point to Zone Point, within this area are habitats such as reefs and rocky shores.
- Estuaries e.g. the Falmouth Estuary and the Helford Estuary.
- Reefs e.g. St Anthony's Head and inshore around Manacle Point.

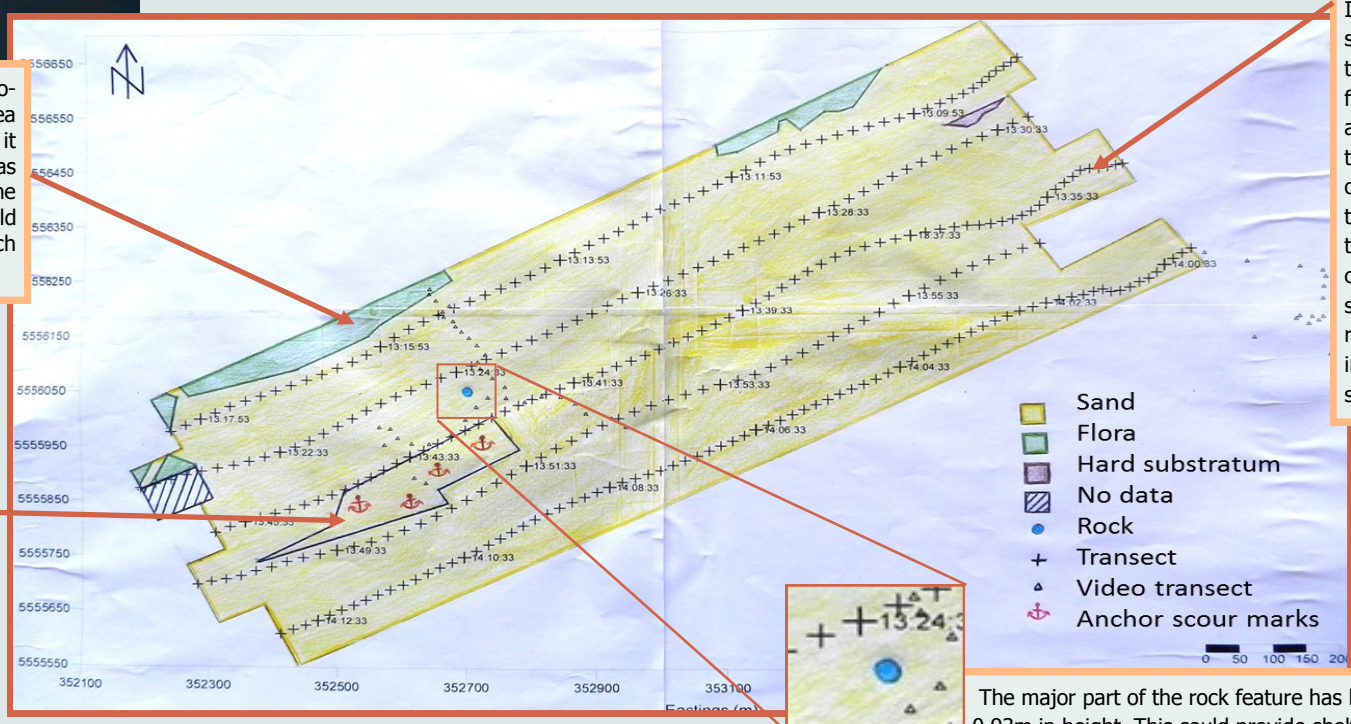
Falmouth Estuary is also affected by various pollutants. Due to a high number of boats docking at Falmouth Harbour, oil spills have occurred as well as leaks of tributyl tin into the estuary from anti-foulant paints. Sewage treatments works in the local area have been directly and indirectly discharging pollutants into the Falmouth system. Mine drainage discharges and remobilisation of metals from sediments also pollutes the estuary. Our aim was to map part of the Falmouth area to investigate the effects the Falmouth estuary and pollution has on different zonations of habitats.

Methods

Research has been done on MST Viking in the Falmouth Bay area between Pendennis Head and Swanpool Beach on 28th of June 2013 between 13:08 UST and 14:13 UST. Five parallel lines were pre-established at 100 m intervals (Line 5 being closest to the shore, Line 1 being the furthest), so that it was possible to survey the whole investigated area. Converting the coordinates into Eastings and Northings was essential in order to precisely determine dimensions of the area and transfer it into the 2D image. A sidescan sonar towfish on both 415 kHz and 100 kHz frequencies was used to examine the bed's surface along the established lines. Camera observations were made across the lines 5 and 3.

The sidescan trace showed dark patches towards the outermost edge of the survey area where ripple marks are still visible. Though it was not possible to groundtruth these areas with a video recording, the patterning within the patches suggests beds of seagrass. This would be home to small fish and invertebrates, such as gobies and dogwhelks.

In the outlined anchoring zone there are a few scour marks from the anchors of vessels in the area. The largest scour was shown to be 0.38m deep, which is large enough to have a substantial effect on the benthic fauna in the specific area. These anchor scours can destabilise the surrounding sediment, having a detrimental effect on the sessile fauna in the zone, as they are fixed on the substratum and cannot avoid such actions.

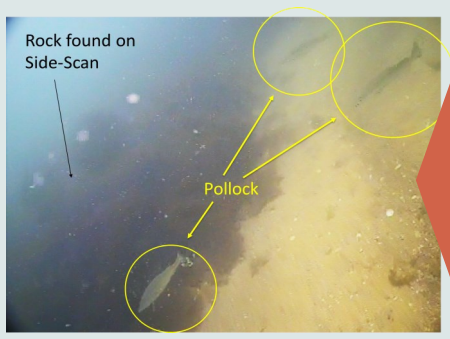


Track Plot

In transect 3 the ripples in the seabed are at their largest, with them being calculated to be from anywhere up to 16.2 cm at their deepest. The pattern of the ripples is also characteristic of an area of sediment controlled by wave motion rather than the water current. This can be seen on the sidescan sonar maps as the wave driven ripples are inconsistent and irregular in their layout on the seabed.

The major part of the rock feature has been calculated to be 0.93m in height. This could provide shelter for small fish such as fry or gobies, and the rocks will also provide a stable and solid surface for algae to attach to, as a lot of red algae, namely Rhodophyta, was seen in the area on the video footage.

Video Trawl 1



The aim of the first video trawl was to find the isolated rock that was identified in the side-scan between transects 3 and 4. We were successful in finding it, though since we were drifting at the mercy of the currents and wind, we were unable to get a clear image of the fauna and flora occupying it. There was footage of a school of Pollock, which possibly feed and take shelter around the rock.

The video across the sub-tidal sandbanks also managed to capture a clear image of part of a maerl bed. Around the UK maerl is only found on a short section of the South coast, and it provides a unique environment for other fauna and flora. Therefore it is protected by the SAC, which is why we were unable to do any mud grabs in that location.

The rest of the area covered by the first trawl was mostly rippled bedforms which were sparsely covered in algae, collected in the troughs. In terms of fauna, there were many shellfish (clams/scallops dead and alive) and a high abundance of common starfish. The number of starfish would account for all of the empty clam and scallop shells. This is especially evident in the screenshot to the left, where a starfish is seen to be breaking into a shellfish.

Video Trawl 2

The second video trawl was deployed with the intention of capturing the wildlife across the far end of all transects. Unfortunately, as we were unable to control our direction, the trawl moved out to sea rather than across the end of transects. Luckily the first small section did cover the correct area and showed a great variety of algae (chlorophyta, rhodophyta and phaeophyta) and even some fry. The presence of the fry indicates that these seaweed beds could be fish nursery grounds, the algal cover providing shelter from predators.

Video Trawl 3

The last video trawl was deployed near to the coast and drifted across the transects - vertically down the plot, close to the location of the first trawl. As predicted by the boundaries on the track plot, rippled bedforms with sparse fauna were seen. The fauna included shellfish and starfish, and the substrate moved from sandy to coarse sediments as the camera drifted away from the coast. A Compass Jellyfish was identified near to the shore along with a clear image of a Common Starfish further out.

Conclusion

The habitats predicted using the sidescan appear to match those seen in the video trawls. The rock identified on 2 parallel transects (3 and 4) was found on the video, albeit from a distance. From the side-scan we were also able to predict the height (or depth) of such features, though further investigation would be needed to confirm the figures calculated.

As you can see from the difference between the planned track plot and the path of the vessel on the habitat map, the transects are not perfectly parallel but were treated as such for this survey. This decreases the accuracy and reliability of the side-scan, but in reality it is near impossible to manoeuvre a large boat in perfectly straight lines across incoming tides and waves. For the purpose of habitat mapping the sidescan is an extremely useful method of remote sensing that can be used to predict the boundary lines of zones across a large area of the seabed. It can also identify features of unique interest, such as the rock and scour lines shown above. Shipwrecks have also been identified using this method. It saves hours of *in situ* searching and means that scientists can travel straight to the predicted area of interest and have a high chance of locating it.

Sediment type and causes of bedform ripples are other factors we can infer from the side-scan, both of which affect the type of habitat which can be established there. The videos taken captured the gradual changes in sediment type and ripple form with distance from shore, which was also noted on the sidescan printout. There was much correlation between the two methods, suggesting that sidescan is an adequate and relatively accurate method of surveying large areas, with video trawls and sampling for verification where possible.