St Mawes Harbour Benthic Habitat Mapping

Date: 25/06/14
Time (start of initial transect): 13:33:30 (System AST)
Survey Vessel: MTS Xplorer
Position (start of initial transect): 50°09.2846N 5°01.2161W
Sea State: ~1m waves **Weather:** Light wind, 3/8 cloud cover

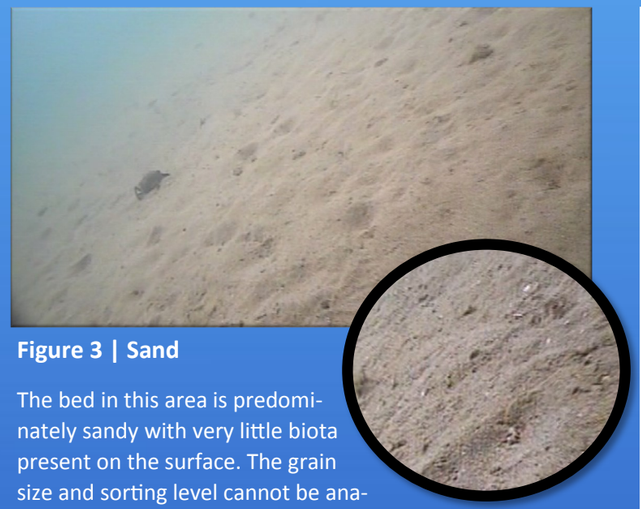


Figure 3 | Sand

The bed in this area is predominately sandy with very little biota present on the surface. The grain size and sorting level cannot be analysed in detail as no samples can be taken in this protected area, but it appears to be medium/coarse and moderately well sorted. There is evidence of infauna living here as the surface has been disturbed with small pits and mounds – as well as a few crabs. Some isolated patches of seagrass are also present.

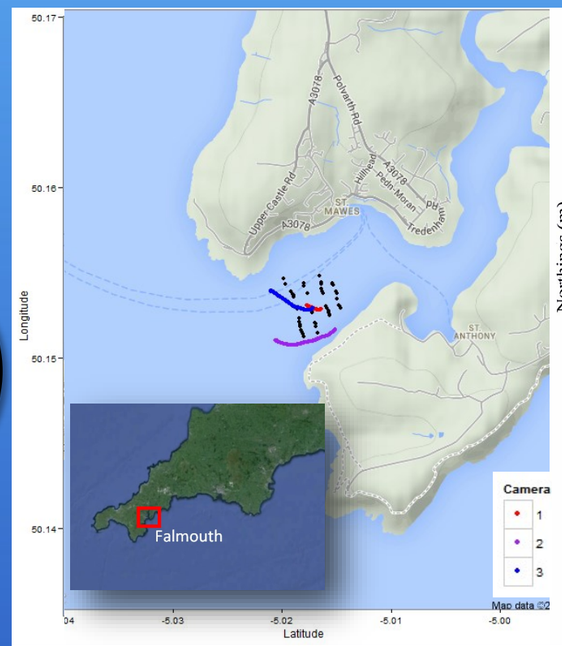
Background

St Mawes Harbour is found in the south east corner of Carrick Roads in the Fal Estuary (Cornwall, UK), the third largest natural harbour in the world. It is an industrialised estuary that has been heavily affected by pollution (Pirrie et al. 2003) – particularly heavy metals that have been washed into the estuary from nearby mines.

The estuary has been designated a Special Area of Conservation (SAC) (JNCC. 2014) due to the range of important habitats found in the area, including sandbanks, mudflats and Atlantic salt meadows. Sea grass beds also provide an important nursery ground for a variety of species.

Aim

The aim of this project is to create a comprehensive habitat map of the seabed in St Mawes Harbour, showing the range of benthic habitats found in the area.



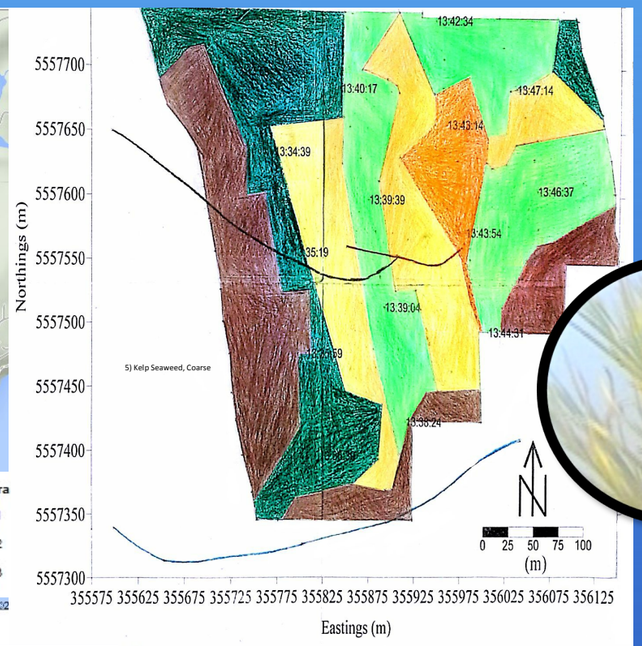


Figure 1 (up & left) | Google® Maps images of the Fal estuary and location of both sidescan and camera transects. **Figure 2** (up & right) | Habitat map of St. Mawes showing the different areas on the seabed, classified by the organisms observed on the camera transects and the obvious substrate.

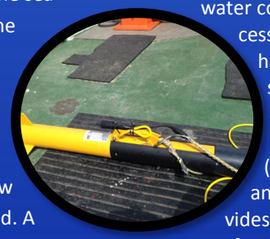
Figure 4 (left) | Mixed algal bed (Sea Grass, Kelp, Sea Lettuce and *Pilayella littoralis*)

This habitat shows a composition of aquatic vegetation, (eelgrass and algae), which provides food for grazers (for example: sea slugs), refuge from predation for epibenthic fish and decapod crustaceans and a nursery habitat for newly settled juveniles fishes (wrasse, sand smelt) and decapods (Sogard and Able, 1991). Vast quantities of the seaweed *Pilayella littoralis* is found throughout the habitat.

Methods

A side scan sonar system was used along 4 transect lines of the St Mawes Harbour. This system included a tow fish as the deployed instrument and geo acoustics which was used to produce imagery and texture of the seabed. A 150m range was used (75m either side of the tow fish) allowing for each transect to overlap in order to create a large, clear picture of the sea floor. The fish was located roughly 1m below the surface water for all transects.

Video recordings were also taken of the sea floor which followed 3 different drifting lines of the boat. It was made sure that each of the videos taken crossed the 4 transects of the side scan so that the different habitats on the seabed could be matched to the side scan sonar results. A combination of data from the two were used to estimate the habitat map above.



References

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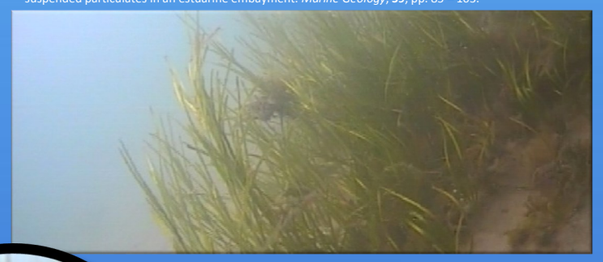

Figure 5 | Eelgrass meadows (*Zostera sp.*)

Eelgrass meadows is used as a nursery ground (Lazzari and Stone, 2006) for many species of fish such as wrasse, sand smelt, cod and others. Growing in meadows on sandy subtidal areas they also provide shelter from physical stress, such as currents, and predators for crustaceans (crabs), fan worms and fish.

Discussion

From the Track plot, 5 different benthic habitats can be seen. The area is dominated by mixed seaweeds, sea grasses and kelps, with sand contributing to the remainder of the surveyed area. Habitat 1 shows very little epibenthic activity with the exception of a few crustaceans. This is due to the lack of shelter and the instability of the sediment due to the absence of sea grass, which contributes to stabilising the sediment. The sea grass attenuates wave energy which increases deposition and supresses resuspension of particulate material (Ward et al. 1984). However there is significant evidence for a vast and varied infaunal community. This is similar to habitat 4 which consists of sand and patchy sea grass, where the seagrass provides some shelter for epibenthic fauna but it is likely that the infaunal community dominate the habitat. The analysis of these habitats was limited by the inability to obtain grab samples due to St Mawes being located within a Special Area of Conservation (SAC).

From the benthic map we can infer possible characteristics of the water column. For example seagrass requires salinity in excess of 5‰ in order to fully develop (Duarte 2002). As habitat 2 is dominated by dense seagrass, we can assume that the salinity of the water column in habitat 2 is above 5‰. Seagrass is able to grow under a wide range of temperatures (approximately 6°C – 30°c) (Bulthuis 1987) which allows it to grow alongside kelp and other macro algae as seen in habitat 2. This provides significant shelter for epibenthic fauna and acts as a nursery for juveniles. This is also seen in habitat 3 which consist of mixed seaweeds which act as shelter. It is the ability of seagrass and seaweed to act as shelters that allows the site to be classified as a SAC.

Habitat 5 is dominated by kelp which would indicate that the above water column is rich in nutrients, as kelp thrives in cold, nutrient rich waters.

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