The views expressed are those of the individuals concerned and do not express the views of the University of Southampton or those of the National Oceanography Centre Southampton.

Habitat mapping and sidescan sonar in the Fal and Helford Marine conservation area.

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Date: 07/07/2017

Location: 50° 08.2 N, 005° 01.0 W

Vessel: Xplorer

Tide: HW 04:56, LW 11:27 (BST)

Wind: 4-6Kn, NW

Sea state: Flat, calm

Introduction and aims:

The Fal estuary is under constant anthropogenic influences, giving reason for the formation of the Fal and Helford Marine special area of conservation (SAC) (fig.1) in 2006 (CIFCA, 2017). This was to limit the impacts of activities such as a £20m dredging project in 2013, that could have damaged the protected seaweed beds (BBC, 2011). Remote sense images from a side scan sonar were coupled with discrete bed observations through a mounted camera to survey the seafloor topography and species diversity at site 11 (shown by blue pin on image 1).

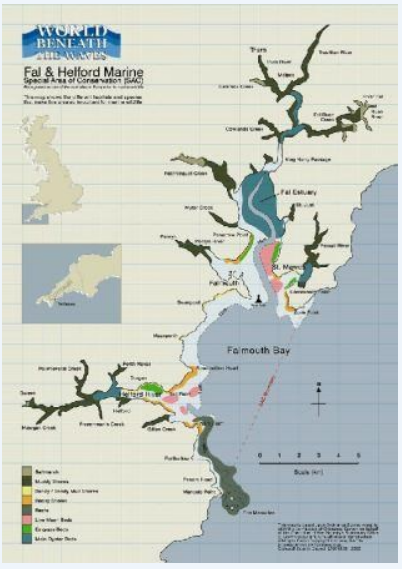

Figure 1: Map of conservation zone

The aim of this project was generate a seabed habitat map for this particular location. This site was chosen due to its unique location which is adjacent to the SAC boundary within the protected area.

Methods:

Side scan sonar and videography were used to assess habitat type at site 11.
Side scan sonar measures the amount of sonic backscatter reflected from the substrate. Producing a sidescan trace of the surveyed area. Darker colours represent harder substrates, shadows can be used to determine the height of rock etc. The side scan system being used in this case worked at 100KHz with a swath width of 150m, the survey speed was ~4Kn (~2ms^{-1}).
Once the four side scan transects were complete a video system was used to ground truth the area. Three sites were selected using the side scan read out, a rocky site, a sandy site, and a site that transitioned from rocky to sandy. Videography is a useful tool for ground truthing as it enables observation of the seafloor which can be used to verify substrate type.

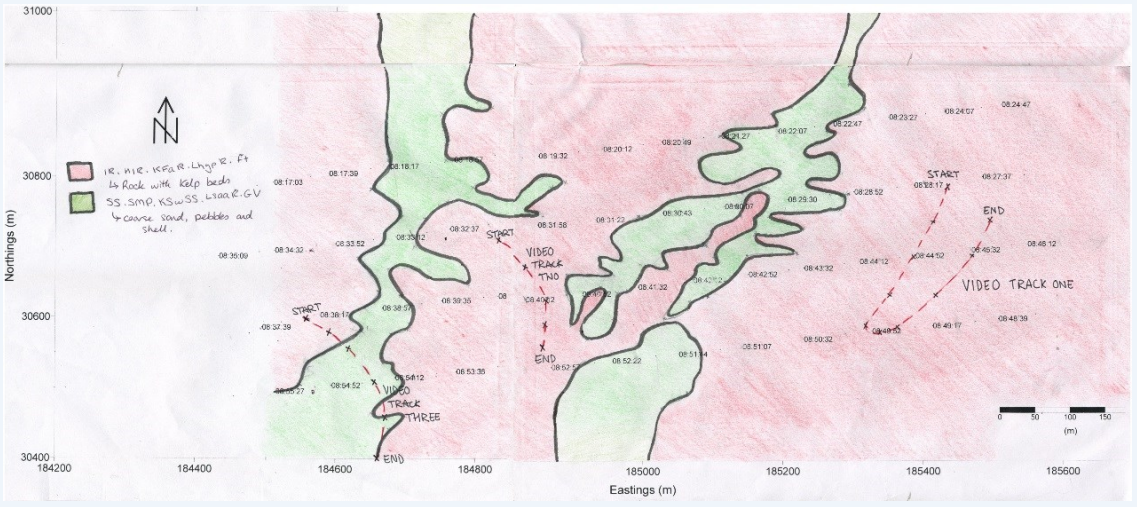

Figure 2: Map of habitat type using sidescan sonar data.

In this case, rocky substrates with kelp beds were most common. There were a number of sandy areas with small pebbles.
A sediment grab was not conducted due to time constraints and the relative unreliability of grabs on rocks and pebbles.

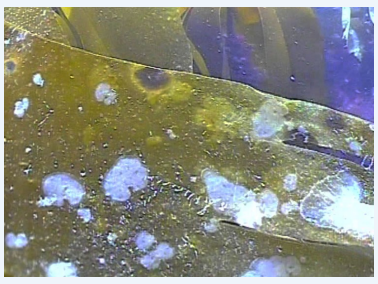

Image 2: Bryozoan on kelp.

Image 3: Sandy sediment.

Habitat types found:

There were two main types of habitat found at site 11, kelp beds anchored to rocky substrates, (IR.HIR.KFaR.LhypR.Ft); and gravel, coarse grained sand and pebbles (SS.SMP.KSwSS.LsaaR.GV); represented in images 2 and 3.
The most common species of kelp is *Laminaria saccharina,* many bryozoans and hydrozoans were encrusting on kelp blades. Below the canopy dense turfs of red foliose seaweeds are found. Certain environmental conditions such as a lack of nutrients, or storms cause destruction of kelp beds (Smale and Vance, 2015).
The sandy sediments were made up of coarse sand, small pebbles and broken shell, meaning they have a high biogenous content.
Codes of habitat type were found in Marine Habitat Guide For Britain and Ireland.

Discussion:

Kelp have strong holdfasts which attach to rocky substrates, allowing them to withstand high wave action. They provide protection to the understory and shoreline by reducing turbulence and wave action. The blades provide an ideal habitat for small encrusting organisms, principally the Bryozoan (Førde, H. 2014) *Mercenaria membranacea*.
Sandy substrates have lose grains, the high wave action causes them to travel forming ripples in the sediment (Leckie, 1988). The kelp and Rhodophyta in the sandy regions are unable to grow to their full size as the pebbles they are attached to are small and less capable of anchoring them to the substrate.

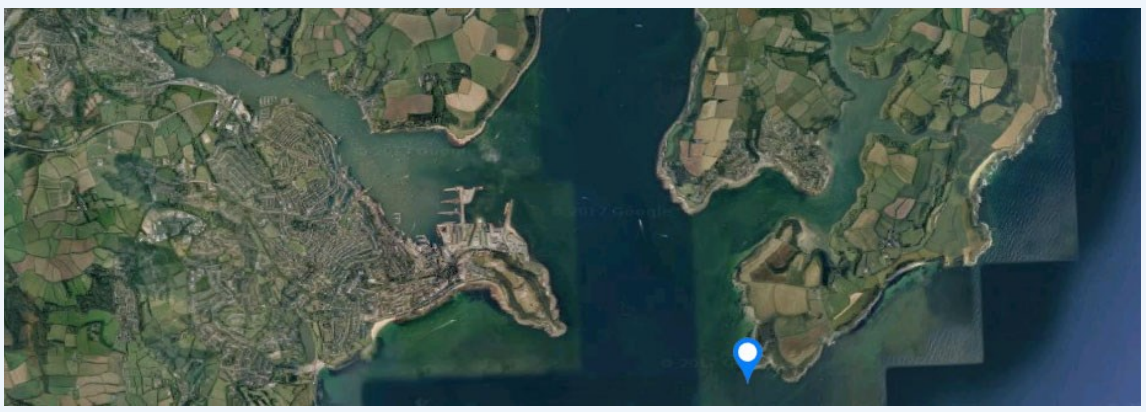

Image 1: Map of Falmouth and location of site 11.

Førde, H. 2014, 'Development of bryozoan fouling on cultivated kelp (Saccharina latissima) in Norway', Institutt for biologi.
Smale, D.A. and Vance, T. 2015, 'Climate-driven shift in species' distributions may exacerbate the impacts of storm disturbances on North-east Atlantic kelp forests', Marine and Freshwater Research, 67, 65-74.
Leckie, D. 1988, 'Wave-Formed, Coarse-Grained Ripple and their Relationship to Hummocky Cross-Stratification', Journal of Sedimentary Petrology, 58, 607-622.
BBC. (2011) Falmouth harbour dredging 'may start 2013' chancellor says. *BBC news*. Available from: http://www.bbc.co.uk/news/uk-england-cornwall-15963791. [Accessed: 08/ 07/ 2017]
Cornwall Inshore Fisheries and Conservation Authority (CIFCA). (2017). *Fal and Helford SAC : Cornwall Inshore Fisheries and Conservation Authority (CIFCA)*. [online] Available at: http://www.cornwall-ifca.gov.uk/UK0013112 [Accessed 8 Jul. 2017).