Geophysical Habitat Mapping of the Helford River Mouth

Group1: Caitlin Cunningham, Bryony Costello, Freya Mitchell, Molly Brown, Alycia Smith, Louis Chancellor, Ramona Allemann

Earth and Ocean Science, University of Southampton, Highfield, Southampton, SO17 1BJ

Introduction

The Fal and Helford area is in Cornwall, on the South West coast of England, where is it subject to both recreational and commercial use. The Fal estuary comprises of several different and rare habitats which are key in ecosystem structure, as they are efficient carbon sinks and also nursery grounds for juvenile fish. The Fal is protected by DEFRA [1], and is recognised as a SAC (special area of conservation). By using video footage, Van Veer grabs and a sidescan sonar, habitat mapping can be accomplished.

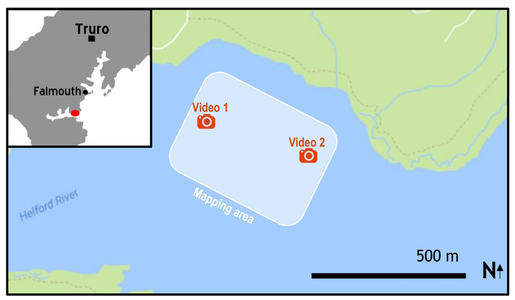
Importance of habitat mapping

Habitat mapping is important (especially over large time-scales), as changes in position and size of these habitats can be recorded and observed. As the Fal estuary is a large port for many ships, there are many species which are sensitive to dredging and trawling, and so they must be protected (hence why grabs are not allowed in certain areas).

Methodology

The data collection was done on the 8th of July 2017 from 08:07 to 10:09 UTC. The wind and sea state was 1 on Beaufort scale with high tides at 4:39 and 16:57 and low tide at 11:08 UTC.

A subsurface Dual Frequency side scan was run at 100 kHz, with a swath of 75m. The side scan was towed behind the MTS Xplorer along the 5 transects in the Helford River vicinity (centre location 50°6.035'N, 5°6.549'W).



Data was collected from the 100 kHz survey and printed onto a paper trace. Areas with different backscatter signals were identified, and with a video recorder, we could estimate where and what the different benthic habitats were.

Video imaging of the benthic habitat was carried out twice in the Helford river, however the later video recording was shortened due to obstacles in the water. Video was used for species identification (identifying both seabed fauna and flora) which supplemented the side scan paper trace data by ground-truthing the habitats. We quantified these findings by calculating percentage cover of species.

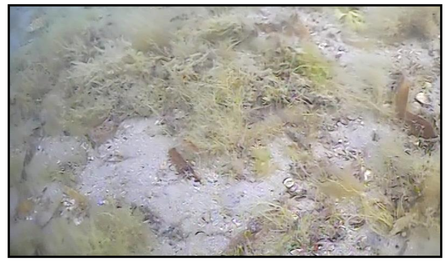
Biomes and Features

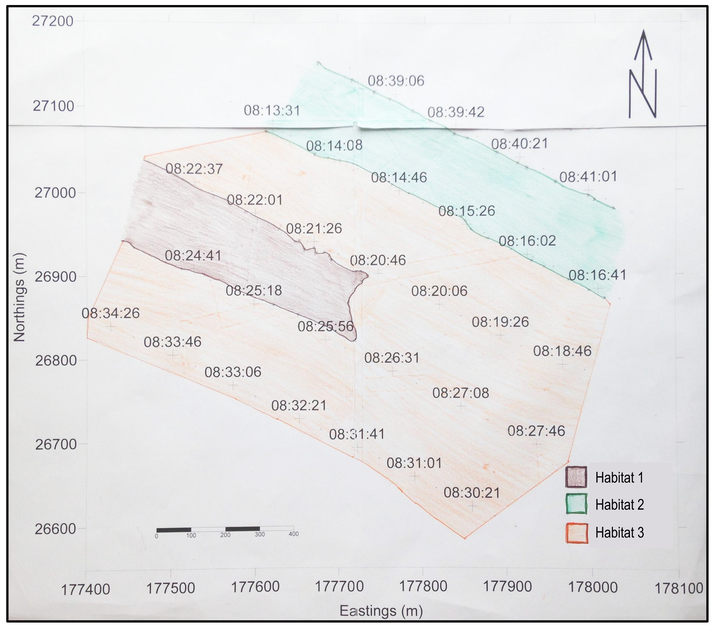
Habitat 1 – Sandy sediment

This habitat is characterised by two areas. The first is bare shell sand, scattered with low profile individual macro algae. Red and green macro algae are present and on average cover 70% of the sandy sediment. The second area is characterised by dense aggregations of red and green macro algae, containing multiple species. The only identifiable species was *Laminaria saccharina* debris.

Habitat 2 – Sandy sediment close onshore

We did not groundtruth this area. According to the similar acoustic reflection patterns seen, the definition of this habitat was extrapolated from habitat 1 as being sandy sediment.





Habitat 3 – Eelgrass bed

Video 1 ground proofed that this habitat is characterised by dense eel grass (*Zostera marina*), which appears to compete with red macro algae species for space and light. On average, eelgrass covers 53% of the ground and the algae 38%. Encrusting organisms, likely bryozoans, cover much of the eel grass blades. Several anemones, likely examples of *Anemone viridis* were observed attached to the upper parts of sea grass blades. Some small fish, closely resembling juvenile Pollock or Wrasse, were observed within the eel grass but quickly hid from the camera.

Conclusion

The surveyed area contains three soft sediment habitats. Ground truthing was not possible over all 5 transects, and thus only specific points of interest were chosen to sample. Also no grabs were taken whilst in the Helford River as it is under the SAC, and so no benthic analysis was obtained.

The eelgrass beds (habitat 3) are the main reason for the conservation efforts in this area. It provides a three-dimensional structure with an enlarged surface area for sessile organisms such as hydrozoans. Furthermore, it acts as nursery grounds for fish and crustaceans and provides protection from tidal currents [2]. The video record supports this statements as several juvenile fish, bryozoans and anemones could be identified.

The sandy sediment of habitat 1 shows fauna that is less attached to the ground, such as macro algae. In the western part of the mapping area, close to Durgan Beach, is a mooring area. Remnants of moorings were identified on the sidescan. Eelgrass beds would be dislodged by moving mooring chains and anchors. It is most likely that the habitat 1 is found around this zone. Therefore, it is important to conduct mapping surveys close to mooring area to identify their impact on the ecosystem and provide a base for conservation policies.

Habitat mapping using sidescan sonar has specific limits and disadvantages:

- Rough sea state and bypassing boats can influence the backscatter.
- The sidescan analysis alone does not include benthic infauna and only shows a part of the biodiversity of the surveyed area.
- Identifying biological structures such as an oyster bed does not give information about its condition.

In future surveys the groundtruthing of habitat 2 should be conducted to give evidence to the extrapolation of the patterns observed in habitat 1.

References

[1] Joint Nature Conservation Committee. 2017. Special Areas of Conservation (SAC). [ONLINE] Available at: http://jncc.defra.gov.uk/protectedsites/sacselection/sac.asp. [Accessed 9 July 2017].

[2] Helford Marine Conservation Group. 2017. Helford Voluntary Marine Conservation Area. [ONLINE] Available at: http://helfordmarineconservation.co.uk/. [Accessed 10 July 2017].