

Habitat Mapping of Area Using Sidescan Sonar

The aim of this study was to survey an area within the Plymouth Sound to identify and map different habitats and to investigate the biodiversity of the species present within the habitats.

On the morning of the 5th of July 2018, our group went aboard RV Xplorer to undertake a geophysical survey of the area east of the eastern channel leading into the Plymouth Sound. Our survey consisted of 4 transects within the area displayed in figure 1 towing a Kongberg dual frequency digital sidescanner, and 2 video logs of the seafloor whilst drifting over the transect lines.

Our survey area was selected due to the contrast in seafloor types, and also as we wanted to survey the area west of Ramscliff Point, as during a 2012 study taken by blah blah this area was pinpointed as a protected seagrass bed. We read 2 sets of coordinates off the chart for the start and finish of the final transect, and then converted these from WGS84 coordinates to OSGB36 coordinates. Using the navigation software on the boat, we were able to programme the transect and then produce 3 transects, each 100m apart to the left. We started on the western most transect as the high tide was at 10:57 and we were hoping to be surveying over the seagrass beds at high water allowing us to get closer to the shore.

Next, using the side-scan sonar image, we were able to locate some areas of interest with which to investigate further using the camera. We ran 2 video drifts over the transects, but due to the tide being close to slack water, we didn't drift as far or as fast as expected.



Fig.1 Chart plot of survey area



Fig. 3 Sidescan image of Beaufort Rock, located at 50° 20.01' N 004° 08.00' W, which is an example of the rocky substrate habitat.

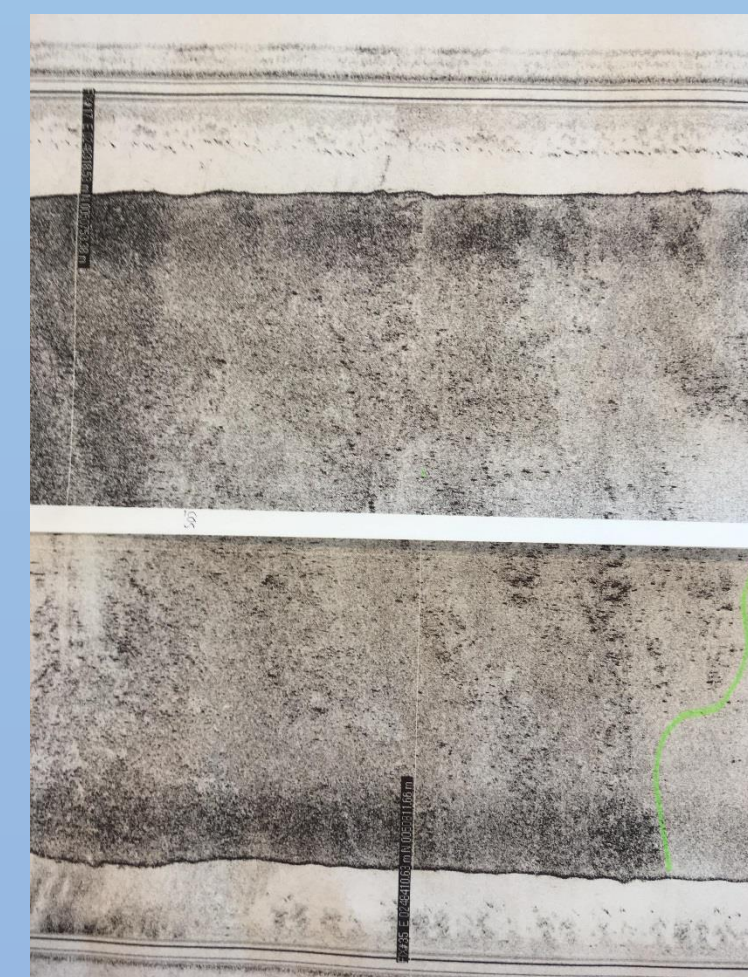


Fig. 4 (left) Sidescan image of broken rocky substrate.

We found the bottom composition to be mostly sand with intermittent rock. The region of rock in the south-west corner of the survey area is Beaufort Rock, and from the sidescan image it appears to be bed rock, as shown in figure 3. In contrast, the rocky region north of Beaufort Rock appears to be more broken up, with rocks in varying in size and interspersed with sandy areas, as shown in figure 4.

From the video footage these rocks were mostly habitat for kelp and macroalgae. Little interpretation could be done for the ecosystem of the sandy substrate without a grab, which was forbidden due to the area being marked as a special habitat for seagrass (reference)

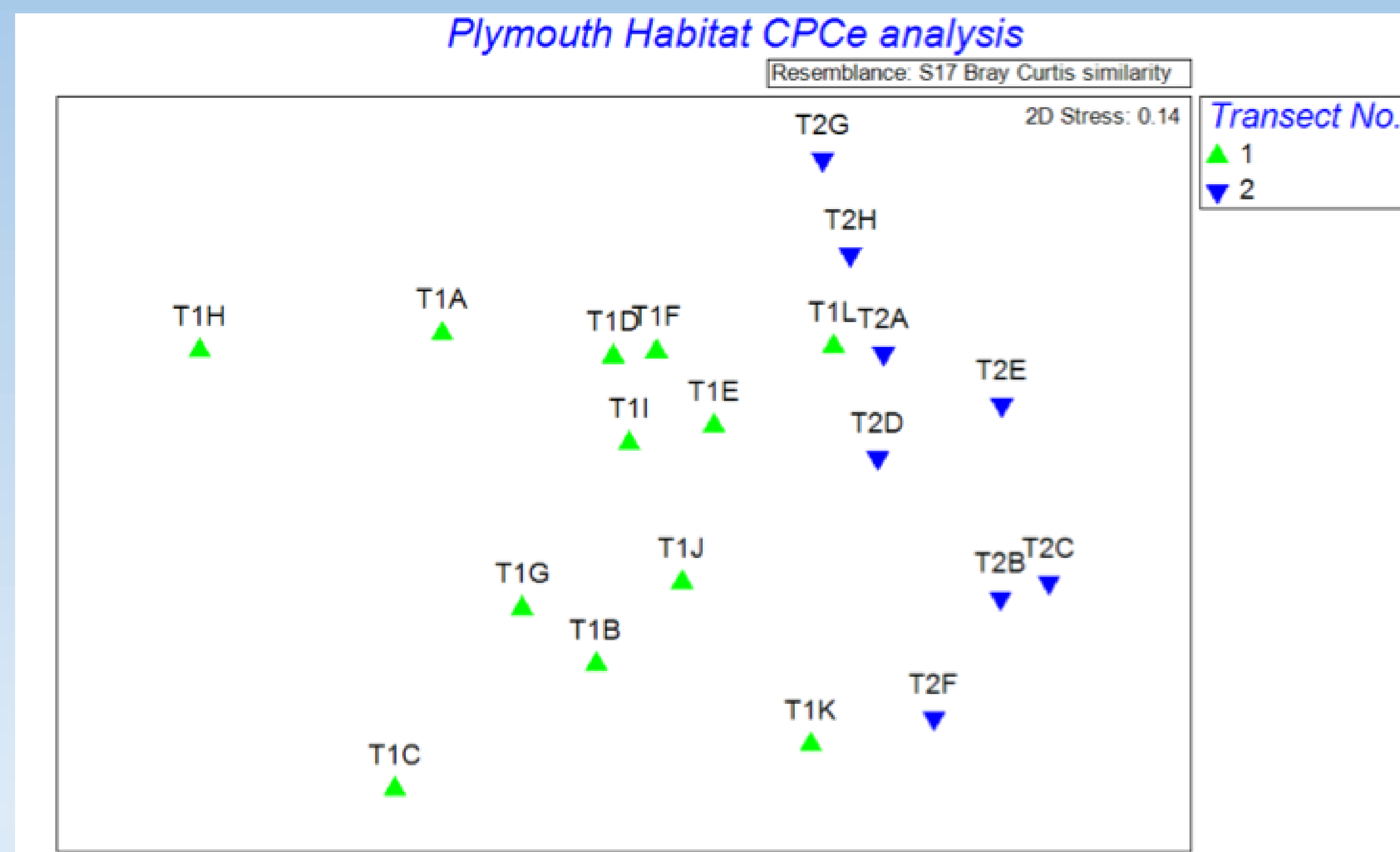


Fig. 5 Shows an MDS plot presenting the similarity of species found between sites along the two transects. Similarity is perceived by the distance between points, T1(green) representing "Transect 1" and T2 (Blue) representing "Transect 2". The 2D stress value was noted down as 0.14, indicating that the variability is represented accurately. A distinct difference can be seen between species found in T1 and T2.

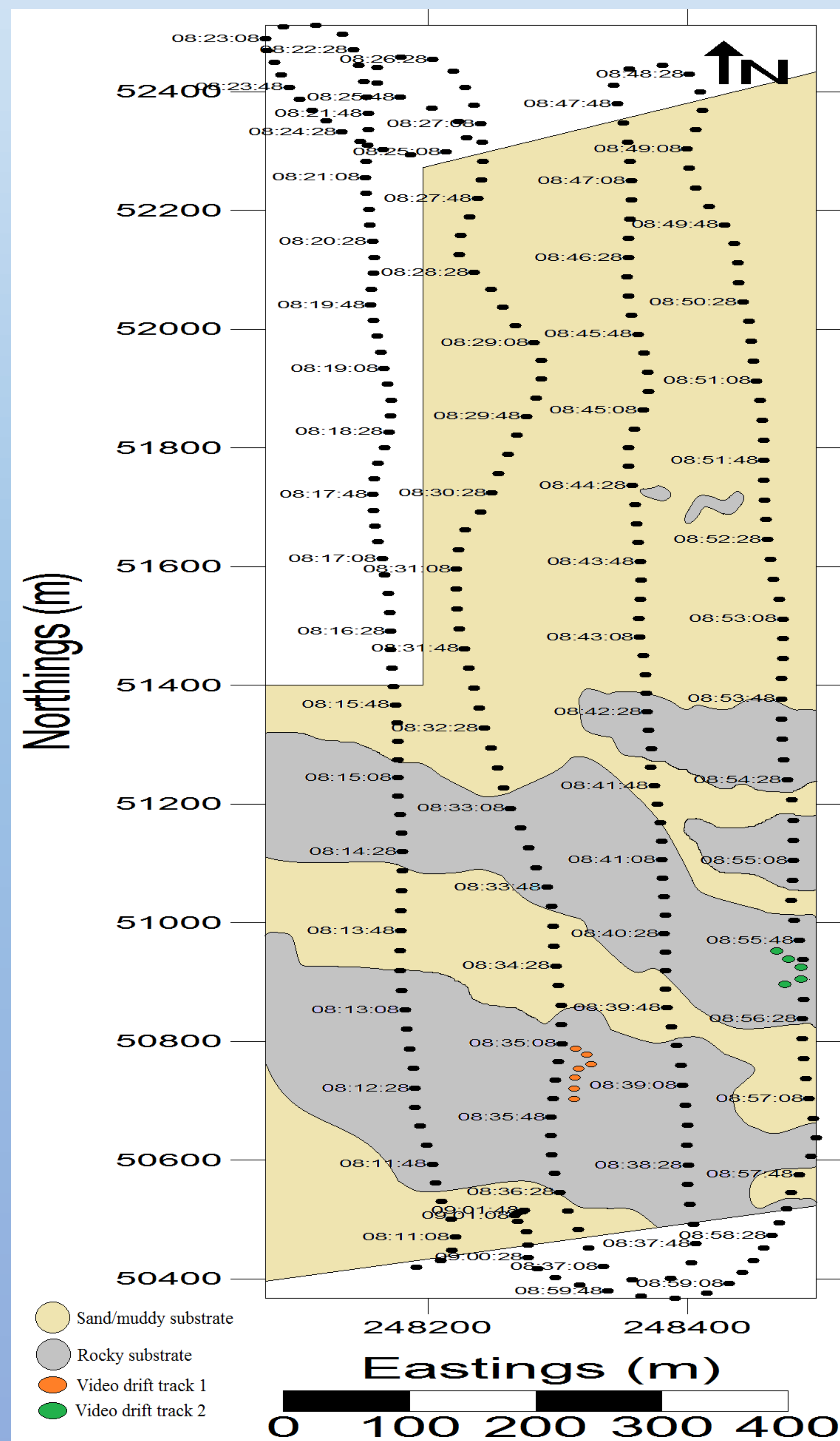


Fig. 2 Habitat map of survey area shown in figure 1



Fig. 6 Screen-shot of video footage from drift track 1, showing invasive species, *Sargassum muticum*.

Species assemblages were observed through video footage deployed over the side of our vessel "The Xplorer Falmouth". T1 was taken along a transect starting from 50°20'14.0706N 004° 07'59.6010 W to 50° 20'11.4726 N 004° 07'58.9860 W. T2 was taken along a transect starting from 50° 20'18.720 N 004° 07'49.47 W to 50° 20'19.8000 N 004°07'50.5770. Species found were subtidal macroalgae. An invasive species was observed in the screenshot above. Results showed a significant difference in species assemblage between sites regarding the results from ANOSIM analysis (one way ANOVA), **P = 0.02**. The Global R value shows us, however, that there is no significant relationship between T1 and T2, **Global R = 0.332**.

Above we can see the invasive species *Sargassum muticum*, originating from Asiatic waters at the Isle of Wight before spreading across the southern coast of the United Kingdom. *S. muticum* competes with seagrass, which is an important habitat for several fauna (Plass, 2018). Plymouth is a Special Area of Conservation and houses important seagrass and Kelp species(Curtis, 2013)(Posford Duvivier Environment, 1997). The habitats surveyed to observed to be a gradient over sandy habitats sparse of macroalgae to exposed rocky surfaces, where an abundance of macroalgae could be seen(Posford Duvivier Environment, 1997). Plymouth, known for ports, is susceptible to invasive species due to global shipping traffic introducing foreign species from ship hulls, ballast waters, etc.



Fig. 7 Sidescan image of sandy/muddy substrate.



Fig. 8 Screen-shot of video footage from drift track 2 showing sandy substrate.

In summary, our findings showed two major substrate habitats: coarse sand and rocky outcrops. In order to get a complete understanding of the benthic habitat, species were surveyed using an underwater camera. An increase of algal species aggregates could be seen in rocky outcrop substrates, while a sparser spread and lower density of species could be seen in sandy bottom habitats. The main algal species found was *Laminaria spp*, many of which had filamentous hydrozoans attached. Other *Rhodophyta* and *Chaetomorpha* species could also be observed. The invasive species of *Sargassum muticum* was spotted in the video footage. This is a topic of interest due to its competition with *Laminaria spp*. As *S. muticum* species spread a drastic change in ecology and species of the area could be seen.