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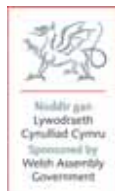
JNCC Report

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Broad-scale biotope mapping of potential reefs in the Irish Sea (north-west of Anglesey)

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6. Summary and conclusions

6.1 Overview of results

- i. High resolution multibeam bathymetry and backscatter data were obtained for all four survey areas.
- ii. Seventeen grab samples were obtained in three of the four survey areas. None were taken in Area 3.
- iii. Twenty-nine video tows were obtained from all four survey areas.
- iv. The results from each of the four survey areas suggest the seabed is broadly characterised by complex topography and mixed sediment mosaics that are home to benthic communities that thrive in tide swept environments.

6.2 Interpretation of acoustic data

- i. The multibeam bathymetry revealed a variety of interesting seabed features, indicating the different characteristics of the four study areas. Study Areas 1 and 2 covered a depth range of 40–100m and contained numerous glacial features, such as ribbed moraines and drumlins. Area 3 was characterised by a shallow plateau whereas Area 4 had a number of rock outcrops.
- ii. Backscatter amplitude showed variations within each of the study areas. Changes in backscatter in Areas 1, 2 and 3 were aligned to the dominant current direction, suggesting movement of finer sediments by strong tidal currents.
- iii. In general, variation in backscatter intensity corresponded with changes in substrata and associated habitat, although on a fine scale such changes could not be accurately matched. This could be a result of the different sampling scales of acoustic versus direct (grabs, video) sampling.

6.3 Interpretation of biological data

- i. Analysis of the infaunal component of the 17 grab samples showed that all samples belonged to the same biotope, “*Mediomastus fragilis*, *Lumbrineris* spp. and venerid bivalves in circalittoral coarse sand or gravel” (SS.SCS.CCS.MedLumVen).
- ii. Samples were characterised primarily by the sea spider *Achelia echinata*, the bristle worms *Aonides paucibranchiata* and *Mediomastus fragilis*, the polychaetes Harmothoinae, and the common mussel *Mytilus edulis*.
- iii. Insufficient samples were obtained to determine whether the clusters identified through multivariate analysis represented the natural range of variation within one biotope or whether each cluster represents a genuinely distinct sub-group of that biotope. The prevalence of SS.SCS.CCS.MedLumVen throughout the Irish Sea, and

- its known variability could indicate that there are distinct sub-biotopes still to be described.
- iv. A range of biological communities were determined from the video analysis. Existing biotopes with the Marine Habitat Classification were found to describe some of these communities. Strong tidal currents were found to be a significant factor in determining the biological communities present.
 - v. Three of the biotopes observed on video were typical of boulder areas subjected to moderate tidal streams (CR.MCR.EcCr.FaAlCr.Flu, CR.MCR.EcCr.FaAlCr.Adig and CR.MCR.EcCr.FaAlCr.Bri). Gravelly sediment was frequently observed in between boulders in these areas, causing scouring in some places. Although two of these biotopes (CR.MCR.EcCr.FaAlCr.Flu and CR.MCR.EcCr.FaAlCr.Adig) were very similar in biological composition, CR.MCR.EcCr.FaAlCr.Adig was associated with a higher presence of boulders and supported more of the soft coral, *Alcyonium digitatum*; CR.MCR.EcCr.FaAlCr.Flu had a higher abundance of scour-tolerant *Flustra foliacea*.
 - vi. In four video tows in Area 1 very high densities of the brittle star *Ophiothrix fragilis*, along with lower numbers of *Ophiocomina nigra*, were present, blanketing the underlying rocky substrate (CR.MCR.EcCr.FaAlCr.Bri and SS.SMx.CMx.OphMx).
 - vii. Gravelly substrates were also common throughout the survey areas, supporting biological communities that did not easily match existing biotopes within the Marine Habitat Classification. For two of these biotopes, the closest match was SS.SMx.CMx.FlyHyd, although the physical and biological characteristics of these two biotopes were distinct, suggesting that further development of this part of the Marine Habitat Classification may be required. The third gravelly biotope had a very sparse epifauna and therefore insufficient biological information to assign a more precise biotope than SS.SCS.CCS, which is described mainly by its physical characteristics. It could be that this was the same biotope as the SS.SCS.CCS.MedLumVen determined from the infaunal data, but without grab samples from the same location, this could not be confirmed.
 - viii. Some video tows revealed a seabed characterised by high densities of empty *M. modiolus* shells. No biotope within the existing Marine Habitat Classification adequately matched this community, although if grab samples had been taken in the same location then the infaunal component may have assisted with the matching process. Very few epifauna were observed amongst the empty shells. However, dredge samples taken from similar habitats elsewhere in the Irish Sea have also been found to be relatively impoverished (I. Rees, pers. comm.).
 - ix. Some of the difficulties encountered with biotope assignment highlight the incompleteness of the existing Marine Habitat Classification in relation to the offshore environment. Data from this study will feed into work, led by JNCC, to improve the Marine Habitat Classification and develop additional biotopes.

6.4 Relationship between acoustic and biological data

- i. In Areas 1 and 2, changes in slope and aspect were complex, and occurred at a very fine scale. Furthermore, slope and aspect were calculated from a 10m grid, whereas changes in biological communities appeared to occur at a much finer scale. This made it difficult to draw any firm conclusions about relationships between these parameters and the biological communities found.
- ii. Area 4 also had complex changes in slope and aspect but again there was no strong correlation between any of these parameters and the biotopes. Area 3 had the most simple topography of the four study areas, however as all biological samples were taken from the top of the plateau, it was not possible to determine any relationships between the distribution of the biological communities across the top, slope and base of the plateau.
- iii. Rugosity was calculated for all four survey areas, but although variations were observed, they appeared to mainly reflect slope variability and did not offer any additional value when attempting to determine the distribution of biological communities across the areas. Rugosity was re-calculated using a higher resolution BASE layer (1m rather than 10m) but this did not result in any improvement; rather, it produced a poorer quality output due to the increased number of artefacts visible. Therefore, rugosity in this project was found to be a less valuable tool to aid habitat mapping than initially expected.
- iv. In all of the four study areas, the parameters derived from the bathymetry (slope, aspect and rugosity) did not appear to strongly correlate to changes in the biology. This could have been due to the differences in resolution and scale of the different sampling techniques, and was probably also due to insufficient biological samples being obtained in such a complex area. The lack of USBL on the video camera may also have exacerbated these difficulties, as there may have been a degree of inaccuracy in the calculated video position. Any relationships between the acoustic and biological data that could be determined were done by visually assessing the bathymetry image in relation to the mapped biotopes.
- v. Due to the issues described above, it was not possible to produce a habitat map for any of the four study areas. In order to fully map the areas, extensive additional biological sampling would be required, with replicate sampling taken over particular seabed features, and planning sampling to map the small-scale patchiness that occurs.

6.5 Identification of Annex I habitats

- i. Annex I reef was found in patches throughout the four study areas, although these were concentrated in Areas 2 and 4, with Areas 1 and 3 having only a few small patches of isolated reef habitat. Where Annex I reef was found, it was comprised of boulders and cobbles, which although scoured in places, supported epifauna such as *Pomatoceros triqueter/lamarcki* and *Alcyonium digitatum*, with hydroids such as *Abietinaria abietina* also common. Along video tows, reef habitat tended to alternate with non-reef habitat, which were more gravelly.

- ii. Annex I reef was linked to the biotopes CR.MCR.EcCr.FaAlCr.Adig and CR.MCR.EcCr.FaAlCr.Flu. In all instances where CR.MCR.EcCr.FaAlCr.Adig was observed, it fitted the definition of Annex I reef. The biotope CR.MCR.EcCr.FaAlCr.Flu expressed some variation, ranging from more gravelly sediment to sediment with a greater abundance of cobbles and boulders. Where the sediment had a higher abundance of cobbles and boulders (40–50% or more) the habitat found was Annex I reef, but where the sediment had a lower abundance of cobbles and boulders, or where these larger particles were more sparsely distributed, the habitat did not appear to fit the definition of Annex I reef.
- iii. Annex I reef in Area 2 was associated with drumlins, which were formed by piles of boulders and cobbles. It is expected that if additional biological sampling of the drumlins were undertaken in this area, more occurrences of reef would be found. In comparison to Area 2, the moraines in Area 1 tended to have much fewer cobbles and only in three short sections of video tow were there sufficient cobbles and boulders to support a reef community. Area 4 had a number of reef patches that were associated with rocky outcrops. As with Area 2, the reef in Area 4 was almost all boulder/cobble reef and supported a similar reef fauna. However, in one location, mixed bedrock and boulder reef was observed.
- iv. A number of grab samples contained moderate abundance of juvenile *Modiolus modiolus* but no adults were obtained within the samples. No live *M. modiolus* shells were observed in the video footage although empty shells were very abundant in Area 3, and in some locations in Area 1. Hence, whilst *M. modiolus* reefs are known to be present in the wider region, no reefs were sampled within this study.
- v. Two grab samples contained abundant *Sabellaria spinulosa* although initial observations indicated that these were more likely to have been from *S. spinulosa* crusts rather than *S. spinulosa* reefs (A. Mackie pers. comm.). No *S. spinulosa* crusts (or reefs) were observed within the video footage. This may be due to the quality of the video footage being insufficient to detect such features, although no video samples were obtained in the vicinity of the grab samples that contained abundant *S. spinulosa*.

6.6 Quality issues with the results

- i. The acoustic data was of very high quality overall, although the south-eastern part of Area 1 was affected by artefacts. Further cleaning and processing of this data could be carried out to try to achieve a higher quality product for this area.
- ii. Due to time limitations and logistical difficulties, no grab samples could be obtained in Area 3.
- iii. Due to the strong tidal currents in the area, efforts were made to sample only during slack water, however the tight schedule and limited survey time available meant that this was not possible in all cases. Therefore, some videos were affected by strong currents, resulting in the camera moving too fast over the seabed and obtaining reduced quality footage. However, the majority of samples were of good quality. In future, it would be recommended that in areas of high currents, every effort should be made to restrict video work to slack water.

- iv. Some problems were also caused by auto-focus functionality of the camera, which resulted in the focus fixing on suspended particles where turbidity was high. In future, consideration should be given to using a manual focus with a high depth of field.
- v. Within this study only video footage was obtained. It is recommended that where possible still images should be taken to complement the video. These would provide additional help in the identification of fauna, particularly the smaller or more cryptic species. A stills camera mounted on the same frame as the video camera, focusing on the same patch of seabed, could be used either to obtain regular images throughout the tow, or to obtain clear images of particular fauna to aid identification.
- vi. The lack of an ultra-short baseline (USBL) system for acoustic positioning on the video camera meant that in some cases there was a mis-match between the logged position of the camera and the location of features visible on the video footage. This created problems when trying to match acoustic and biological data.
- vii. Particle Size Analysis was conducted for eight of the grab samples, which was insufficient to allow the acoustic data to be properly ground-truthed. Further interpretation of the acoustic data could be achieved if additional samples were obtained.

6.7 General conclusions

- i. The results from the current study suggest that the seabed in this study area was broadly characterised by complex topography and mixed sediment mosaics, which were home to benthic communities in tide swept environments. Faunal and substrate observations made throughout the survey area were relatively comparable with those observed in other studies nearby, as well as with some of the biotope predictions made by the HABMAP project. All of these studies indicated a highly complex area, with mixed sediments and biotopes mosaics occurring within small areas that could not be easily discerned without fine scale ground-truthing work.
- ii. This study was hampered by the lack of biological data available to ground-truth the acoustic results. Full coverage habitat maps could not be produced for the four survey areas. It is recommended that further survey work be carried out within this region of the Irish Sea, to build on the current study and further delineate and characterise the biological communities present, in particular those representing Annex I reef habitat.
- iii. Whilst Annex I reef was found in a number of locations, indicating that this could be an area of conservation interest, further work is required to compare the results of the current study with other known areas of reef within the Irish Sea, in order to decide on the most appropriate site for consideration as an SAC.