![MESH MAPPING EUROPEAN SEABED HABITATS]

Title:	**Case Study: Using habitat mapping to predict socio-economic activity: Sussex Sea Fisheries**
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Summary:	This case study reviews a project which re-evaluated a series of low resolution RoxAnn Acoustic Ground Discriminating Sonar (AGDS) data sets collected in 1995, 1996 and 1997, with a view to assessing the suitability of historic datasets, i.e. older, lower resolution data and maps, for baseline habitat data for management purposes.
	The work was funded by the Sussex Sea Fisheries Committee (SSFC), who were able to plot current fishing activity sightings directly onto the habitat base map generated from the historic data. A clear and unequivocal relationship between the mapped habitat types and the potting and trawling activities was shown, demonstrating the utility of old, poor resolution habitat maps for management purposes. Specific applications for fisheries spatial planning to reduce local conflicts are suggested.
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1. Introduction: Application of low resolution mapping to fisheries

1.1. Goals of Mapping

The basic goals of the mapping were to re-evaluate a series of low resolution RoxAnn Acoustic Ground Discriminating Sonar (AGDS) data sets collected in 1995, 1996 and 1997, with a view to assessing the suitability of historic datasets, i.e. older, lower resolution data and maps, for baseline habitat data for management purposes. This was to provide a baseline against which AGDS, collected by fisheries patrol boats to build up maps of their area, could be assessed. The sea bed maps produced would be for general fisheries management purposes, but particularly to relate fishing activity to ground type.

1.2. Pilot Sites

The original surveys had been undertaken along 110km of Sussex coast, from approximately 50° 47'.188N; 0° 39'.502W to 50° 53'.928N; 0° 42'.338E, covering variable areas from 3-12 km offshore. The extent of the site naturally incorporates a wide variety of habitats. Original data was collected for English Nature for baseline habitat mapping for conservation assessment.

1.3. Methods Summary

1.3.1. Original survey strategy

The original survey strategies (1994-1997) involved obtaining comprehensive coverage of the bathymetry and sediment characteristics of the area using acoustic techniques (AGDS), coupled with rapid drop-down video ground truth sampling. A small drop-down system, capable of very rapid deployment was used, to obtain the required number of samples. Of necessity, due to the extent of the survey area, AGDS tracks were widely spaced, and the resulting maps relatively low resolution. A selection of point samples were taken for statistical sampling, to be analysed for infauna and separate samples taken for sediment analysis.

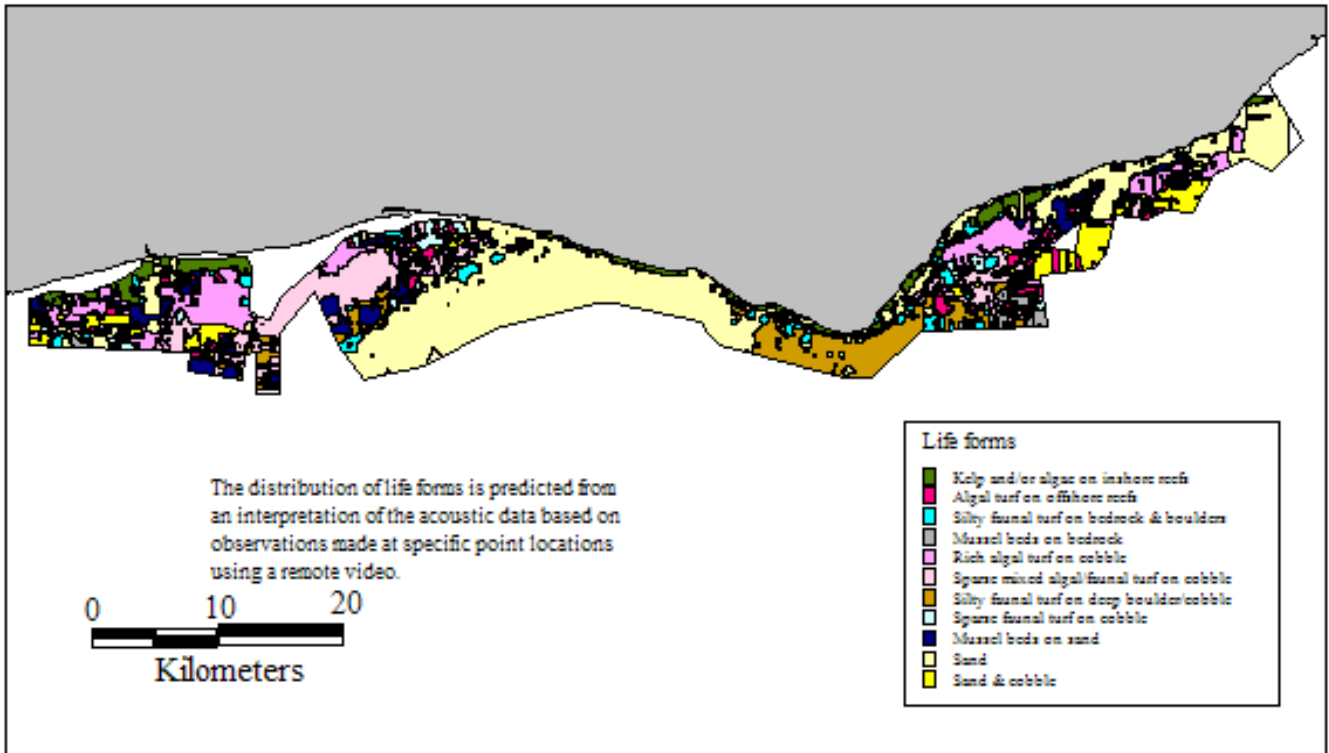Broadscale maps of the area were produced (Figure 1, below).

The distribution of life forms is predicted from an interpretation of the acoustic data based on observations made at specific point locations using a remote video.

Life forms

- Kelp and/or algae on inshore reefs
- Algal turf on offshore reef
- Silty faunal turf on bedrock & boulders
- Mussel beds on bedrock
- Rich algal turf on cobble
- Sparse mixed algal/faunal turf on cobble
- Silty faunal turf on deep boulder/cobble
- Sparse faunal turf on cobble
- Mussel beds on sand
- Sand
- Sand & cobble

Figure 1: Habitats of the Sussex coast interpreted from RoxAnn AGDS data collected 1995-1997

1.3.2. Supplementary Data Collection 2006

In 2006 Envision Mapping partnered the Sussex Sea Fisheries Committee (SSFC), to advise on the use of AGDS collected by fisheries patrol boats to build up maps of the Sussex coast.

The sea bed maps produced were for general fisheries management purposes, but particularly to relate fishing activity to ground type. The time and funds available were very limited and this necessitated variable but generally broadly spaced AGDS tracks. Ground truthing was done using video only, interpreted by supervised classification.

Together this data and the data from 1994-1997 was used to compile a picture of the major Sussex habitats. Trends in composition over time could also be investigated using the historic baseline compiled.

2. The characteristics of the habitat type

The extent of the site naturally incorporates a wide variety of habitats, as outlined in

Table *1*, below.

2.1. Classification

Each of the original data sets collected in 1995, 1996 and 1997, were standardised, interpolated and classified, using the original typology applied to the sample based ground truth data collected (i.e., the video records were not re-evaluated).

New maps were then created by compiling the English Nature RoxAnn AGDS surveys, completed between years 1994-6 for baseline habitat mapping for conservation assessment, with new data.

Coverage was patchy but generally adequate for the purposes of classifying the major life forms. Using the MESH guidelines for assessment of map confidence, this map would lie somewhere between low and intermediate confidence.

2.2. Relationships (i.e. substrate to biota)

Table 1: Major Habitats of the Sussex Coast

Major Habitats of the Sussex Coast
Kelp and/or algae on inshore reefs
Algal turf on offshore reefs
Silty faunal turf on bedrock & boulders
Mussel beds on bedrock
Rich algal turf on cobble
Sparse mixed algal/faunal turf on cobble
Silty faunal turf on deep boulder/cobble
Sparse faunal turf on cobble
Mussel beds on sand
Sand
Sand & cobble

3. Summary

Part of the project was to use archive data from AGDS to contribute to a feasibility study. This aimed to investigate the likely effectiveness of the use of AGDS, collected by fisheries patrol boats, to build up maps of the Sussex coast. Both historic maps and supplementary data collected in 2006 as part of the feasibility study were used to compile a picture of the major Sussex habitats. New collection techniques were assessed against the historic data, and sea bed maps produced for general fisheries management purposes, but particularly to relate fishing activity to ground type.

The interpreted maps were therefore imported into the SSFC GIS (MapInfo). To attempt to confirm the validity of these maps, sighting data collected by SSFC between 2001 and 2005 were superimposed. When plotted in the habitat GIS, records for the main fishing methods, as recorded on the SSFC sightings record sheet for the area, corresponded exactly to the habitat base map.

The Sussex SFC were able to plot their fishing activity sightings directly onto the habitat base map and this showed a clear and unequivocal relationship between the mapped habitat types and the potting and trawling activities, as illustrated in Figure 2, below.

The table below shows records for the main fishing methods as recorded on the SSFC sightings record sheet for the area of the Envision map. Many of the sightings of fishing types are very regionalised and correlate well with the map of ground type/life forms.

Table 2: Relationships between mapped habitat types and Sussex fishery activities

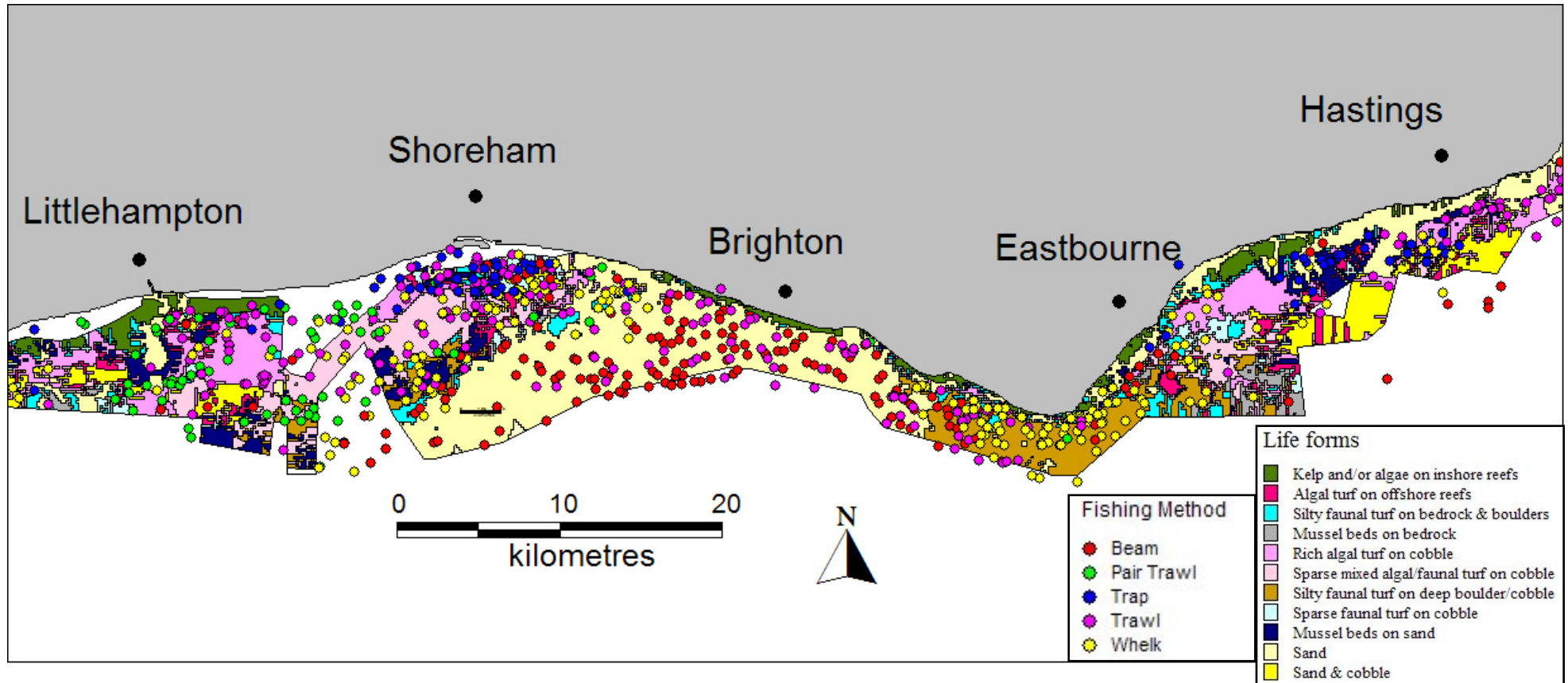| Fishery	Substrate Types Preferred
Whelk	cobbles, reefs and silty boulders
Traps	cobble ground and reefy ground
Pair trawl*	cobble
Beam trawl*	mostly on sandy ground
* Trawls are not very specific with respect to location, except that they seem to cluster either on sand or on cobble.	

Figure 2: Habitats of the Sussex coast interpreted from RoxAnn AGDS data collected 1995-1997, overlaid by Sussex Sea Fisheries Committee Sightings data, describing fisheries activity in the area.

4. Recommendations

This case study demonstrates that work of this type can be used to exploit low resolution habitat data rapidly and effectively. Though the coverage was patchy depending on the data available, it was generally adequate for the purposes of classifying the major life forms.

Using the MESH guidelines for assessment of map confidence, this map would lie somewhere between low and intermediate confidence. However, as long as these issues are appreciated, in the absence of more rigorous datasets, techniques of this type can rapidly provide valuable baseline data for management purposes, in a highly cost-effective manner.

Specific applications for fisheries spatial planning to reduce local conflicts are suggested, as areas of mutual interest to fishers with different gear types are immediately apparent. Such maps have the potential to support the development of zonation policies, for local fisheries conflict reduction.

The habitat maps produced may have a predictive capability with respect to growing stakeholder competition, in certain areas, and as such may be able to inform proactive/pre-emptive management policies.

Further work is required to verify the wider applicability of such work, i.e. in areas that play host to more diverse fisheries patterns, or across wider spatial scales.

5. Conclusion

The work was funded by the Sussex Sea Fisheries Committee, who were able to plot current fishing activity sightings directly onto the habitat base map generated from the historic data. Clear and unequivocal relationships between mapped habitat types and fisheries activities were shown. This case study has demonstrated the utility of older, poorer resolution habitat maps for fisheries management purposes. Specific applications for fisheries spatial planning to reduce local conflicts are suggested.

6. Acknowledgements