



# Accessing and developing the required biophysical datasets and data layers for Marine Protected Areas network planning and wider marine spatial planning purposes

Report No 6: Task 1A. Biotope Tagging of Benthic Sample Datasets (Phase 1)

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**EMU**



Project Title: Accessing and developing the required biophysical datasets and data layers for Marine Protected Areas network planning and wider marine spatial planning purposes

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## Executive Summary

The UK is committed to the establishment of a network of marine protected areas (MPAs) to conserve marine ecosystems and marine biodiversity. MPAs can be a valuable tool to protect species and habitats. They can also be used to aid implementation of the ecosystem approach to management, which aims to maintain the 'goods and services' produced by the normal functioning of the marine ecosystem that are relied on by humans.

A consortium<sup>1</sup> led by ABPmer have been commissioned (Contract Reference: MB0102) to develop and deliver a series of biophysical datalayers to aid the selection of a network of Marine Conservation Zone (MCZ) in England and Wales (and the equivalent MPA measure in Scotland) under the Marine and Coastal Access Bill. Such datalayers will also be of use in taking forward marine planning in UK waters. The overall aim of the project is to ensure that the best available information is available for the selection of MPAs in UK waters, and that these data layers can be easily accessed and utilised by those whom will have responsibility for selecting sites. The project has been divided into a number of discrete tasks, one of which was to biotope tag and translate datasets to an appropriate level in the Marine Habitat Classification for Britain and Ireland collated by the conservation agencies.

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<sup>1</sup> ABPmer, MarLIN, Cefas, EMU Limited, Proudman Oceanographic Laboratory (POL) and Bangor University

# 1 Introduction

## 1.1 Project Background

1.1 The UK is committed to the establishment of a network of marine protected areas (MPAs) to conserve marine ecosystems and marine biodiversity. MPAs can be a valuable tool to protect species and habitats. They can also be used to aid implementation of the ecosystem approach to management, which aims to maintain the 'goods and services' produced by the normal functioning of the marine ecosystem that are relied on by humans.

1.2 As a signatory of OSPAR the UK is required to establish an ecologically coherent network of well-managed MPAs. The UK is already in the process of completing a consisting of Special Areas of Conservation (SACs) and Special Protection Areas (SPAs), collectively known as Natura 2000 sites to fulfill its obligations under the EC Habitats Directive (92/43/EEC). Through provisions in the Marine and Coastal Access Bill a network of Marine Conservation Zones (MCZs) will be designated in England and Welsh territorial waters and UK offshore waters. The Scottish Government is also considering equivalent Marine Protected Areas (MPAs) in Scotland. These sites are intended to help to protect areas where habitats and species are threatened, and to also protect areas of representative habitats. For further information on the purpose of MCZs and the design principles to be employed see [<http://www.defra.gov.uk/marine/biodiversity/marine-bill/guidance.htm>, Defra, 2009].

1.3 Selection of MPAs should be based on the best available data and will come from a range of sources including biological, physical and oceanographic characteristics and socio-economic data such as the location of current activities. To ensure such data are easily available to those whom will have responsibility for selecting sites Defra and its partners<sup>2</sup> commissioned a consortium<sup>1</sup> lead by ABPmer Ltd and partners to take forward a package of work. New Geographical Information System (GIS) data layers to be developed included:

- Geological and geomorphological features;
- Listed habitats;
- Fetch and wave exposure;
- Marine diversity layer;
- Benthic productivity; and
- Residual current flow.

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<sup>2</sup> Joint Nature Conservation Committee (JNCC), Countryside Council for Wales (CCW), Natural England (NE), Scottish Government (SG), Department of Environment Northern Ireland (DOENI) and Isle of Man Government.

1.4 The current report describes the methodologies used to biotope tag and translate grab and video data, and still images in Phase 1 of the task. The second Phase will be delivered in October 2009.

## **1.2 Aims and Objectives**

1.5 The scope of work asked for the following: 'Datasets will need to be biotope tagged and translated to an appropriate level in the Marine Habitat Classification for Britain and Ireland (version 04.05) . A Biotope complex code (i.e. EUNIS Level 4) should be the minimum strived for, as Broad habitat codes and Habitat complex codes (i.e. EUNIS Levels 2 and 3) do not include biological information. Where possible Biotope codes and Sub-biotope codes (i.e. EUNIS Levels 5-6) should be worked to, however it is noted that adequate information may not be available to determine this level of detail. Where a Biotope complex code can not be identified due to lack of information then the appropriate Broad habitat code or Habitat complex code should be chosen. The corresponding habitat type from the EUNIS 2007 habitat classification scheme will also be provided for each Marine Habitat Classification biotope tag.

1.6 Benthic sample datasets are to be formatted and provided in Marine Recorder format. Where data agreements allow it is also expected that biotope tagged datasets will be returned to DASSH for Data Archiving'.

## **1.3 Format of Report**

1.7 The report has been divided into three sections. Section one provides an introduction to the project with section two outlining the methodologies used for the three data types. Section three provides a commentary on the issues arising from the data provided.

## **1.4 Data Description**

1.8 A team led by ABPmer in association with Emu Ltd, MarLIN, POL, Cefas and a number of related experts have been contracted by Defra to deliver the biophysical datalayers for Marine Conservation Zone (MCZ) network planning (Contract No. MB0102) project. The overall aim of the project is to ensure that the necessary biophysical datalayers are delivered for MCZ network planning (and equivalent Marine Protected Areas in Scotland). This project has been divided into a number of tasks to assist in the production of these data layers. The aim of this work package (Task 1A) is to provide biotope tags for available data sets provided by JNCC.

1.9 Three data types were provided to Emu Ltd. for analysis with respect to determination of biotopes. The data types provided were as follows:

- Grab data
- Video data
- Stills image data

1.10 Table 1 lists the data sets that were provided to Emu Ltd with an indication of the extent of this data, the level to which it had already been analysed and the level to which it is anticipated further analysis would be required. The table headings identify the following:

- The survey/data set for each of the above data types, with year, month, survey vessel and location
- The number of samples included in the data set
- The number of samples for which primary data has been acquired, i.e. species identity, enumeration or abundance estimation of data and collection of physical descriptions including particle size data where appropriate.
- Where primary data has been acquired the type of data format.
- Whether the data acquired has already been biotope tagged.
- For those data where a biotope tag has been provided the level of confidence associated with the biotope tag.
- The number of samples for which translation to the EUNIS codes is required.
- Whether the samples are already in Marine Recorder.

1.11 In addition to the data identified in Table 1 further data were provided by JNCC with respect to CCW grabbing surveys for inclusion in the analysis. The data provided for these surveys are summarised in Table 2.



**Table 1: Summary spreadsheet of anticipated data review requirements**

<b>Grab Samples Survey/ dataset</b>	<b>No. Samples</b>	<b>Primary data acquired</b>	<b>Analysis type</b>	<b>Biotope tagged</b>	<b>Low confidence</b>	<b>Eunis required</b>	<b>In Marine Recorder</b>
2003_06 - RV Lough Foyle - North West Irish Sea Mounds	11	11	Day Grabs; Count	0	0	11	Yes
2003_07 - RV Prince Madog - Irish Sea Pilot Project	20	20	Day Grabs; Count or p/a	20	20	20	Yes
2003_07 - RV Prince Madog - Outer Bristol Channel Survey	230	230	Day Grabs; Count	0	0	230	Yes
2004_07 - RV Noticluca - Outer Bristol Channel Survey	26	26	Day Grabs; Count	0	0	26	Yes
2004_11 - RV Lough Foyle - Sandbank E of Isle of Man	63	63	Day Grabs; Count or p/a	63	0	63	Yes
2005_05 - RV Cefas Endeavour - East and Western English Channel	53	53	Hamon Grab; Count	0	0	53	Yes
2005_07 - RV Cefas Endeavour - Eastern English Channel	151	151	Hamon Grab; Count	0	0	151	Yes
2005_07 - RV Cefas Endeavour - Eastern English Channel ME3112	9	9	Hamon Grab; Count	0	0	9	Yes
2005_07 - RV Celtic Voyager - HABMAP Irish Sea Survey	55	55	Van Veen; Count	0	0	55	Yes
2005_08 - RV Celtic Voyager - NW of Anglesey	16	16	Van Veen; Ccount	0	0	16	Yes
2006_06 - RV Cefas Endeavour - Central English Channel	10	10	Hamon Grab; Count	0	0	10	Yes
2006_07B - RV Cefas Endeavour - Eastern English Channel	73	73	Hamon Grab; count	0	0	73	Yes
2006_07C - RV Cefas Endeavour - Central English Channel	95	95	Hamon Grab; count	0	0	95	Yes
<b>Video datasets Survey/ dataset</b>	<b>No. Samples</b>	<b>Primary data acquired</b>	<b>Analysis type</b>	<b>Biotope tagged</b>	<b>Low confidence</b>	<b>Eunis required</b>	<b>In Marine Recorder</b>
2007_01 - RV Corystes - NW Irish Sea Mounds	1	0		0	0	1	No
2006_07C - RV Cefas Endeavour - Central English Channel	46	46	SACFOR	46	46	46	Yes
2005_05 - RV Corystes - Sandbank E of Isle of Man	5	0		0	0	5	No
2004_11 - RV Lough Foyle - W Hebrides	10	10		10	10	10	Yes
2004_10 - SV Kommandor Jack - SEA 6 Irish Sea Survey Leg 3	54	0		0	0	54	No
2004_07 - RV Lough Foyle - W Hebrides	16	16		16	16	16	Yes
2003_07 - RV Prince Madog - Irish Sea Pilot Project	5	5		5	5	5	Yes
<b>Stills datasets Survey/ dataset</b>	<b>No. Samples</b>	<b>Primary data acquired</b>	<b>Analysis type</b>	<b>Biotope tagged</b>	<b>Low confidence</b>	<b>Eunis required</b>	<b>In Marine Recorder</b>
2006_06 - RV Cefas Endeavour - Central English Channel	300	0		0	0	300	Yes
2005_05 - RV Corystes - Sandbank E of Isle of Man	49	0		0	0	49	No
2004_10 - SV Kommandor Jack - SEA 6 Irish Sea Survey Leg 3	1247	0		0	0	1247	No
2004_02 - RV Lough Foyle - Blackstones Bank	24	0		0	0	24	No
2003_07 - RV Prince Madog - Irish Sea Pilot Project	37	0		0	0	37	Yes
2003_06 - RV Lough Foyle - North West Irish Sea Mounds	61	0		0	0	61	Yes
2003_06 - RV Lough Foyle - Irish Sea	56	0		0	0	56	No

**Table 2: Summary spreadsheet of additional grab data from CCW**

Grab Samples Survey/ dataset	No. Samples anticipated	Primary data acquired	Analysis type	Biotope tagged	Eunis required	In Marine Recorder
1982 Rostron PMSA -Milford Haven sediment survey	125	125	Grab - SACFOR	0	125	Yes
1993 Rostron PMSA -Skomer MNR sediment infauna surveys	17	17	Grab - SACFOR	0	17	Yes
1996 Hobbs PMSA -Millford Haven Waterway, subtidal macrobenthos survey	36	36	Grab - SACFOR	0	36	Yes
1996-1997 Environment Agency macrobenthic monitoring in coastal waters adjacent to Milford Haven	55	55	Day Grab - count	0	55	Yes
1998 Barfield PMSA -Skomer MNR sublittoral macrobenthos survey	20	20	Grab - SACFOR	0	20	Yes
1998 CCW Benthos of Cardigan Bay cSAC	33	33	Grab - count	0	33	Yes
1999 Environment Agency sublittoral sediment survey east of Cardiff, Severn Estuary	51	51	Grab - count	0	51	Yes
2000 CCW_ St Brides Bay	66	66	Grab - count	0	66	Yes
2001 Environment Agency Environmental impact assessment of Borden Chemicals long sea outfall	45	45	Grab - count	0	45	Yes
2007 CCW Cardigan Bay	51	51	Grab - count and SACFOR	0	51	?
2007 CCW Conwy Bay	52	52	Grab - count and SACFOR	0	52	?
2007 EA Cardigan Bay	45	45	Grab - count and SACFOR	0	45	?
2007 EA Conwy Bay	30	30	Grab - count and SACFOR	0	30	?
2007 CCW Red Wharf Bay	32	32	Grab - count and SACFOR	0	32	?

1.12 The total number of samples processed therefore, are listed in Table 3.

**Table 3: Analysis requirements for the biotope tagging of the initial MPA data layers data set**

Requirement	Grab data	Video data	Stills data
Total to be primary analysed	0	60	1774*
Total to be newly tagged	1376	60	1774*
Check on biotope	20	31	1181 <sup>+</sup>
Eunis translation needed	1470	91	2955
New data into Marine recorder	210	60	1376
Revision of data to Marine recorder	1260	31	1579

(\*data were subject to rationalisation depending on time available to complete this component, + 10% subsample required).

1.13 The degree to which the analysis stages could be met and the biotopes generated are summarised in each of the data output appendices. These appendices relate to the three data types.

- Appendix 1 - Grab data
- Appendix 2 - Video data
- Appendix 3 - Stills images

## 2 Methodology

### 2.1 Data Provision and Structure

- 2.1 Data were provided in several formats, related to the analysis required. The source data for the benthic grab section were provided via a Marine Recorder SnapshotDatav40.mdb database. These data were already in a version appropriate for further analysis, i.e. site and species matrices, with enumerated or presence absence values. From this data Excel files for each of the survey data sets could be exported for further analyses. Problems arose with respect to the larger data sets, which could not be exported without the data crashing, while using Marine Recorder Report Wizard. These larger data sets were supplied directly from JNCC (Ian Saunders).
- 2.2 Once transferred into Excel the following format for data handling was employed for the grab data.
- A source data file with all data as supplied (database format or Excel)
  - Sub-files for each separate survey, each containing a copy of the source file, a working Excel file to enable modification to the extracted data, a “PRIMER ready” Excel file with a finalised version of the data for inclusion in the analysis package, a file with biotopes identified per site. This sub-file also contained the biotope analysis working files (PRIMER files and exported clusters for comparison with biotopes in Excel) and initial biotope output files.
  - A sub-file with final output biotopes per site for each survey.
- 2.3 The stills image data were provided as .jpg files. Each of the survey areas was stored in an archive file prior to transfer to a working file structure. The working file structure comprised sub-files comprising the source image data per survey area, with associated Excel files for inclusion of the extracted species data, consisting of enumerated, SACFOR or percentage values. A PRIMER file was included, per survey area, where appropriate. A separate sub-file was included with output biotopes per site for each survey.
- 2.4 The video data were provided as .mpg files. Each of the survey areas was stored in an archive file prior to transfer to a working file structure. The working file structure comprised the source video data per survey area, with associated Excel files for inclusion of the extracted species data consisting of enumerated, SACFOR or percentage values. A separate sub-file comprising the output biotopes per survey area was generated from these data.
- 2.5 Further supporting data were provided in the form of reports and survey logs to enable quantification of data with respect to both the video and stills images. This related to the estimation of the image area provided, which in most cases was not evident from the data extracted from the raw

data provided. The image area, where provided, has been included in the relevant output appendix.

- 2.6 Other data included in the file structure were the condensed comparative tables of biotopes, derived from the JNCC website ([www.jncc.gov.uk](http://www.jncc.gov.uk)). These were only employed for the sedimentary biotopes and were converted from a database format to an Excel spreadsheet, comprising species against biotopes, with enumerated values on the basis of 1m<sup>2</sup> and 0.1m<sup>2</sup> areas. Following discussion with JNCC an updated version of this data set was provided to Emu Ltd.
- 2.7 The final data file included was a condensed version of the EUNIS conversion values.
- 2.8 All data utilised in this analyses and the resulting biotopes will be included within Marine Recorder.

## 2.2 Analysis Methods

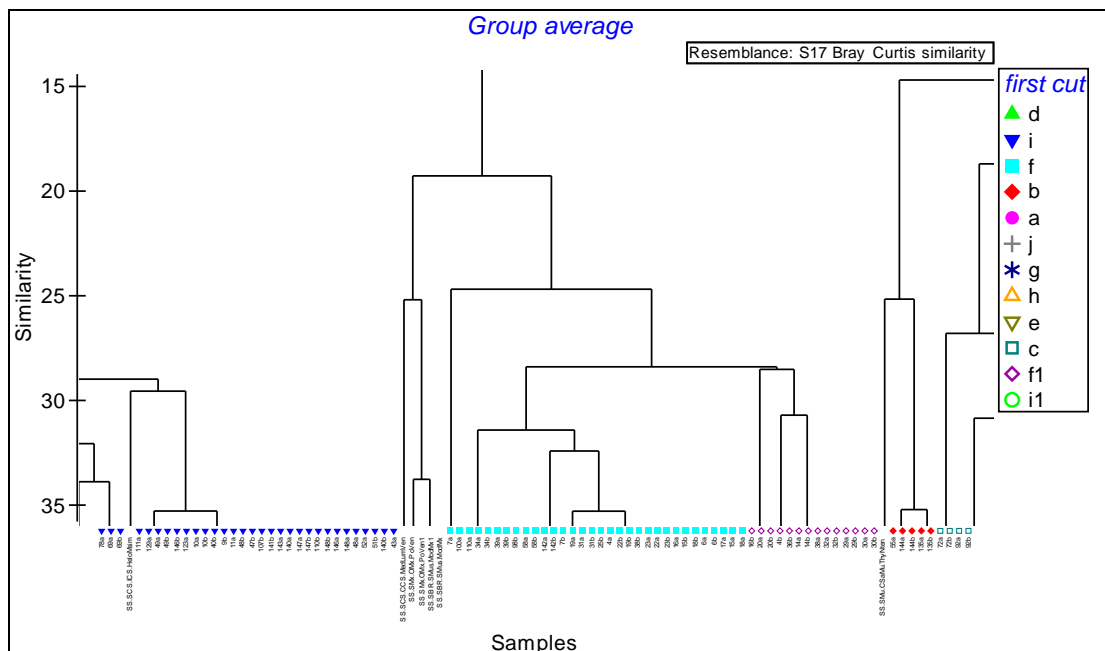
- 2.9 The method of analysis for each of the different data formats was as follows.

### Grab data

- 2.10 Each of the raw data sets was reviewed to identify any duplication of species data, occurrence of juveniles and inclusion of presence/absence data. These data were truncated such that juveniles were included with adults, replicated species data were combined and non-specific identification, i.e. *Syllis* sp A, *Syllis* sp B were converted to Genus level, *Syllis* spp. Presence/absence data was converted to a value of 1 for presence. SACFOR data was turned into numeric data (1 =R, 6 =S). All of these conversions were retained in the working file version of the data.
- 2.11 Each spreadsheet was then cleaned (ancillary information removed) and zero values entered for blank cells. The remaining spreadsheet, therefore, comprised a species by site matrix with enumerated values. The site numbers used were either the original survey site number or the Marine Recorder Sample Event ID with Sample Reference and, where needed, replicate value. The format chosen depended on the format in which the source data was supplied.
- 2.12 The final data sheet, referred to as “PRIMER ready” was imported into the PRIMER package and subjected to cluster analysis. No data transformation was employed as the biotope descriptions are weighted towards occurrence of dominant species, hence groupings generated by the cluster analysis needed to be formed primarily on the basis of the high abundance, dominant species rather than lower density species. Alternative transformations were employed to test this approach. An initial clustering of the data was derived, using SIMPROF on the smaller data sets to derive statistically significant groups. The larger data sets

were subjectively divided at various, percentage similarity, cut levels. The faunal compositions of the clusters generated were individually exported into Excel spreadsheets using SIMPER.

- 2.13 As a guide to the potential biotope that the clusters may be matched with the full spreadsheet of comparative biotopes (using 1m<sup>2</sup> and 0.1m<sup>2</sup> values as appropriate), both the website version and the version supplied directly from JNCC were imported into each PRIMER analysis. By running the data sets together, groupings of survey sites and biotopes were identified (see example Figure 1). Where SACFOR conversions of survey data were used the JNCC data set (1m<sup>2</sup>) was log<sub>10</sub> transformed to enable appropriate comparison.



**Figure 1: Example of classification output with biotope data integrated. Sites in colour with biotopes in extended text**

- 2.14 The technique of grouping biotopes and sites provided variable degrees of success, with, in some cases, clear relationships evident based on the same dominant or characteristic species. Other associations were based on subdominant species, which therefore required more detailed comparison of the fauna, as well as groupings evident between multiple biotopes with clusters of sites. This methodology therefore was only used as a first level of investigation, with more detailed comparison required in all cases.
- 2.15 The detailed additional analysis comprised individual comparative analysis of the derived clusters (species composition) with that of the most likely biotope. The method made use of the search facility on the website ([www.jncc.gov.uk/marine/biotopes/BiotopeSearch.aspx](http://www.jncc.gov.uk/marine/biotopes/BiotopeSearch.aspx)) primarily using species or genus names. In some cases it was evident that some clusters comprised more than one biotope, particularly for the large data sets where SIMPROF could not be usefully employed. These clusters were split into smaller groups to determine if any discrete clusters of sites

could be found to correspond with particular biotopes. Similarly some clusters could be grouped together as they were effectively the same biotope or, as in most of these cases, a biotope complex or habitat.

- 2.16 In several instances a largely infaunal biotope was identified, with an associated epifaunal overlay, in some cases as an identifiable biotope. Where these and other variations were identified they were noted on the final biotope spreadsheet.

### Video data

- 2.17 The methods used to review video footage follow that set out in JNCC's Marine Monitoring Handbook, Procedural Guideline 3-5: *Identifying biotopes using video recordings*, pp 241-251 with the following indicating the specific methods employed in this case. Data acquisition and biotope definition were provided by Seascope.
- 2.18 For the task in hand, video footage was viewed on a dedicated computer, typically with digital files being viewed using Windows MediaPlayer. A second computer was run with an Excel spreadsheet specifically designed for subsequent data entry into Marine Recorder, with a series of fields entered in the first column. These fields are listed in Table 4 below:

**Table 4: Data entry fields for the video image review**

Video clip no.	Tow speed (description)	Depth band
Cruise name	Duration of tow	Habitat type
Area	Length of tow	Physical categories of substrate
Method	Speed (m/s) of tow	Suggested biotope
Video file source	Sediment type	Confirmed biotope
Video file name	Position at Start of Tow	Biotope confirmed by
Date	Position at End of Tow	Date of biotope confirmation
Time at start of tow	Depth below chart datum (upper)	Description of biota
Visual quality of video	Depth below chart datum (lower)	Identifiable species (no. or abundance)

- 2.18 The data from each video clip reviewed was then entered in adjacent columns.
- 2.19 The start time of the video tow (real time, where this was available) was noted at the start of the video. If real time was not available, then the start time on the video clip was noted (typically this was 0:00 mins, though if the camera was running whilst descending to the seabed this could have been 1 min. or more).
- 2.20 The seabed depth was noted as it appeared on the screen, though most of the recordings reviewed had no depth data available.
- 2.21 Identifiable species were then counted individually as they were encountered. Where it was impossible to identify an organism to species level, then the next taxonomic level in the classification was used. For example, hydroids were often noted as 'Hydrozoa', though certain ones

such as *Nemertesia antennina* were be identified to species level. Hermit crabs other than *Pagurus bernhardus* were noted as 'Paguridae', and starfish as 'Asteroidea' where these could not be identified to species with any certainty.

- 2.22 The distance of the tow on the seabed (taken as a direct line between the start and end positions - where these were known) was then multiplied by the average width of the field of view (typically about 1m) to provide an area of seabed covered. Using the MNCR standard Abundance Scale (SACFOR), an abundance value was then allocated to the species concerned. This abundance value replaced the number of individuals given in any particular cell on the spreadsheet.
- 2.23 For some clips it was possible to allocate abundances directly to the occurrence of individual organisms.
- 2.24 An assessment was made of the seabed habitat components after a certain time (ensuring these always add up to 100%). The proportion of these to each other changed as the tow progressed.
- 2.25 Where the habitat or the biota changed significantly, then a new column for data entry was started, indicating a change in biotope. This 'new' biotope needed to continue for at least 50m (or 1 min. approx.) to be counted as a different biotope. Otherwise, it was included within the previous biotope and the habitat categories altered accordingly.
- 2.26 Biotopes were allocated using JNCC's 2004 Marine Biotopes Classification - internet version (Connor *et al.* 2004), and expert judgement. Accompanying notes on the spreadsheet indicated if the biotope covered the whole or only part of the area surveyed, and whether the biotope match was certain or uncertain.
- 2.27 For those data sets where EUNIS translation only was required, these have been provided as a subset of data within Appendix 2.

### **Stills image data**

- 2.28 Image analysis for the stills data were completed according to the following methodology.
- 2.28 Individual images were extracted from the data files in sequence. The images was opened in a variety of packages including, Microsoft Office Picture Manager and Windows Picture and Fax Viewer. The raw data file was manipulated if the source image was poor, using a variety of settings available, primarily through adjustment of contrast and brightness.
- 2.29 The screen on which the image was viewed was subdivided to enable more accurate counts or estimates of percentage cover to be made for certain species. The zoom facility was also employed for the better quality images to enable greater levels of speciation to be achieved.



- 2.30 Where possible SACFOR estimates were made, however, a number of the image data sets did not have definitive image areas attached or within the metadata or associated reports, hence the actual number of individuals were counted or the percentage cover was estimated. Retrospective conversion to SACFOR was made using the best available information on image area. The data were therefore recorded using Abundance, % cover or SACFOR. Each species also had, where appropriate, an estimate of the range of sizes of the individuals.
- 2.31 Data were recorded onto paper data sheets, with these data transferred onto a digital spreadsheet, comprising the following headings (Table 5).

**Table 5: Data entry fields for stills image data**

Job Name: MPA Data Layers
Job Number: J/1/03/1346
Data Set Name:
Survey Date:
Image analysis undertaken by:
QC undertaken by:
Physical characteristics. Comprising percentages of different sediment type fractions and surface sediment character.
Features on 1-5 scale for rock; including surface relief, texture, scour, shape and siltation
Feature on 1-5 scale for sediments; including surface relief and stability
Other features present comprising biogenic reef, boulder/cobble on rock or sediment, sediment on rock, sand dunes, waves or ripples, burrow, tubes and burrows
Species identification and abundance
Biotope ascribed

- 2.32 Each site within a particular data set related to an individual image. All images were reviewed although the data set for the survey **2004\_10 - SV Kommandor Jack - SEA 6 Irish Sea Survey Leg 3** was subject to rationalisation on the basis of multiple images of the same type of seabed (generally as replicates). For these data a subsample of largely identical images was analysed with biotopes attributed to the other images within the subsample on the basis of the sample analysed. For data requiring review only a 10% subsample was processed. All data outputs are recorded in Appendix 3.
- 2.33 Extensive QC checks were made of the Stills image data with 100% checks made during the early stages of analysis, reducing to 10% after the first 250 images.
- 2.34 The identification of biotopes was completed using PRIMER as an initial sample grouping technique. The integration of the comparative table data for the image data was not pursued as previous experience has indicated that only very low similarity between the actual data and the biotope data could be achieved. An iterative matching process was therefore adopted, with the clustered sites compared using the search facility within the JNCC website.

### 3 Data Issues

- 3.1 The current project has raised issues with respect to biotope assignment both specifically to this project and more generically. The following are issues that have arisen which need to be resolved to enable data processing of this scale to be achieved more effectively.
- 3.2 The comparative table which underpins the biotopes on the JNCC website is not up to date although these data are available from JNCC.
- 3.3 The biotope descriptions on the website contain species information not replicated in the species lists.
- 3.4 The search facility on the website does not search within the species lists. In some cases clearly dominant species are not mentioned in the descriptive text, which are crucial to the structure of the biotope. A method, for iteratively entering key species from the real data, such that a gradually reducing list of biotopes can be generated to which the real data can be matched, is required.
- 3.5 The division of sedimentary biotopes into infralittoral and circalittoral is difficult to employ, with several biotopes that fall within the infralittoral description, extending into the circalittoral. Equally several biotopes comprise coralline algae (i.e. within the infralittoral), yet otherwise fit within a circalittoral description. It is suggested that a revision of the biotopes should provide equivalent biotopes across all three sublittoral regions; infralittoral, circalittoral and offshore. For example, **IMoSa** also exists in the circalittoral zone and could, therefore, be revised to **IFiSa.MoSa** for the infralittoral with the circalittoral equivalent represented by **CSa.MoSa**. The alternative is that all divisions within the sublittoral sedimentary biotopes do not include an implied "depth" component, with inclusion of algal species providing a natural division within the biotopes should they occur.
- 3.6 The source of the data employed to describe the biotope needs to be defined for each biotope as this has an impact on how the biotope has been described and how new data can be matched against the descriptions. For example video described data is unlikely to match well with grab described data. This also raises the problem related to infaunal biotopes and epifaunal overlay biotopes. The current project has attempted to provide a primary biotope per site, but it is evident from numerous other projects, particularly in the Eastern Channel, that two biotopes can be attributed to one location, by employing the same data type and by combining the data types.
- 3.7 An historic problem with biotopes has been the issue of regional variation, with consistent types of biotope occurring widely, but regional variations also evident, which makes it difficult to attribute the biotope with confidence. This requires a basic rethink of the structure of biotopes, either determining biotopes on the basis of biotope species

“types” (with a list of equivalent species included in the description) or providing separate descriptions for each regional biotope.

- 3.8 Specific problems with this project have included difficulty with identification of the field of view for the stills images, which needs to be a data point within Marine Recorder and readily available as metadata within the appendices of all reports. Similarly depth to sample location has been difficult to extract from the data provided with respect to the video data. In some cases this has been rectified through discussion with JNCC but for several data sheets included in the output biotopes appendices data gaps still exist
- 3.9 PRIMER as a supporting technique for identifying biotopes has great potential but the level of data included in the analysis needs to be refined, both that included in the biotope descriptions (referring back to the issue of regionality) and that included in the PRIMER clusters identified.
- 3.10 Several quality issues arose with the assessment of the image data related to the variation between workers for the stills data component with respect to sediment descriptions and level of taxonomic certainty with respect to species identification. In these instances total reworking of data was required.

## References

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Defra, 2009. Draft Guidance note on 'Selection and designation of Marine Conservation Zones' (Note 1). Published by the Department for Environment, Food and Rural Affairs and the Welsh Assembly Government, May 2009.

<http://www.defra.gov.uk/marine/biodiversity/marine-bill/guidance.htm>

JNCC 2001. Marine Monitoring Handbook, Procedural Guideline 3-5: Identifying biotopes using video recordings, pp 241-251.

## **Appendix 1. Grab data outputs**

See outputs on CD-Rom.

## **Appendix 2. Video data outputs**

See outputs on CD-Rom.

## **Appendix 3. Stills data outputs**

See outputs CD-Rom.