

JOINT NATURE CONSERVATION COMMITTEE

MARINE MAPPING - CURRENT PROGRESS AND FUTURE DIRECTION

Paper by David Connor

1. Introduction

- 1.1 This paper explains the current state of progress with marine mapping projects within the JNCC *Marine mapping and area protection* programme, outlines future needs in relation to known and anticipated policy drivers and describes how the future direction of this work area is planned to meet these needs.

2. Background

- 2.1 Information on the character, distribution and quality of marine habitats is fundamental to the delivery of our marine nature conservation advice and for environmental management generally. Such information has focussed in the past on the identification of habitats in need of specific protection (e.g. through the BAP process) and on sites of high nature conservation value (e.g. inshore SACs). Increasingly the emphasis is switching to a need for information on the offshore environment, both to identify offshore sites for protection (SACs, OSPAR MPAs) and as a contribution to wider ecosystem assessment and management requirements via the ecosystem approach.
- 2.2 The UK has a coastline of some 19,000 km and UK waters extend to over 870,000 km², hosting amongst the most diverse set of marine habitats in Europe. All but the very narrow intertidal zone is out of sight, so gaining a comprehensive understanding of these habitats, on which to base sound and considered scientific advice, has and continues to be a major challenge. It is often said that our knowledge of the surface of Mars is far greater than that of our own seas.
- 2.3 Our knowledge of the nature of marine habitats has progressed significantly from a base of virtually no conservation knowledge in the 1970s. From 1987-1998 the Marine Nature Conservation Review undertook a major set of detailed surveys (but no spatial mapping) of the intertidal and nearshore subtidal zone; the resultant data contributed greatly to the initial selection of marine SACs for the Habitats Directive. The data were also used to develop a national marine habitat classification system (BioMar) which now underpins day-to-day conservation and management advice in the conservation agencies and elsewhere. The classification also provided the basis for developing a classification for the north-east Atlantic (for the OSPAR Convention) and the European Environment Agency's EUNIS system, thus providing a foundation for consistent approaches to marine habitats at the European level.

- 2.4 During the 1990's increased demands for more sophisticated marine habitat information and improved technologies led to a wide range of marine habitat mapping studies by Government agencies, marine institutes and industry, variously for nature conservation, fisheries, industry and environmental management purposes. This effort has to date largely been uncoordinated both within and across the different sectors, leading to significant problems of data compatibility and access.
- 2.5 JNCC's increasing requirement for more comprehensive, consistent habitat mapping data to support many strands of its advice work, including a need to understand the importance of UK habitats in a European context, has led to the development of the current mapping projects over the past few years. The significant problems of data compatibility and poor access have, in the process, started to be overcome.

3. **Current mapping projects**

UKSeaMap

- 3.1 A summary of the UKSeaMap project was presented at the June 2006 Committee meeting (JNCC 06 D08). It is a project undertaken by JNCC on behalf of a consortium of UK bodies which have fully funded the work. The project has used available geological, physical and hydrographical data, combined where possible with ecological information, to develop a simple broadscale classification of the main seabed and water column features for UK seas. Since June, the biological validation of the seabed map has been completed, allowing the development of a confidence assessment of the modelled data. This new approach to portraying confidence in the resultant maps is illustrated in Figure 1, and has highlighted a number of aspects of the study which need further investigation; generally, confidence in broad-scale mapping reduces with distance from the coast, which is in part due to the paucity of offshore biological validation data.
- 3.2 The data layers and final landscape maps are now available in a webGIS application (www.jncc.gov.uk/UKSeaMap); the report of the project will be published early in 2007. The project has, for the first time, provided ecologically relevant maps covering the majority of the UK sea area, and will support a range of regional and national applications.

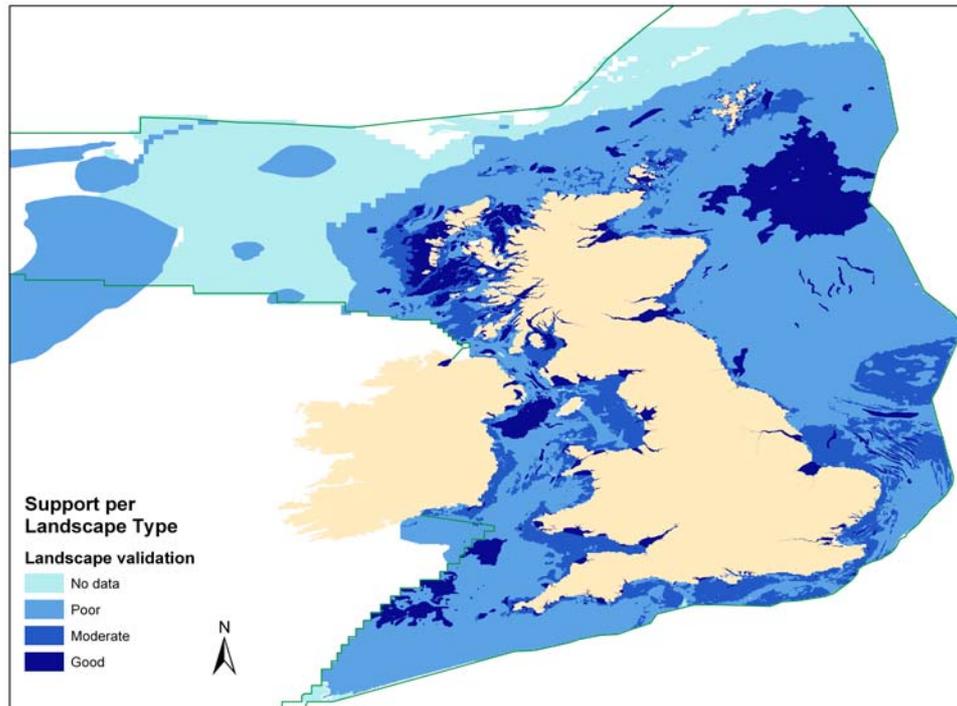


Figure 1: Confidence assessment for the UKSeaMap seabed features map, based on validation by 32,000 biological samples.

Mapping European Seabed Habitats (MESH)

3.3 MESH is multi-partner project, involving 12 institutes across the UK, Ireland, Netherlands, Belgium and France. It is led by JNCC and receives 50% funding from the Interreg IIIB North-West Europe programme. The project started in 2004 and has made substantial progress in:

- i. mobilising existing habitat mapping data held by numerous organisations and which was previously inaccessible;
- ii. harmonising the data to standard GIS data formats and to a common habitat classification system (the EEA's¹ EUNIS classification), so that the data can be viewed and assessed together;
- iii. disseminating the resultant maps via a bespoke webGIS application (www.searchMESH.net/wegGIS) so that it can be used by a wide range of policy, management and scientific end-users;
- iv. establishing the data exchange formats and technical expertise necessary to enable such data to be transferred and processed across organisations, both within the UK and internationally;

¹ European Environment Agency: European Nature Information System

- v. developing standards and guidelines for mapping studies, to help ensure that data emanating from future studies increasingly becomes more intercompatible and can be more easily used to add to our current knowledge of seabed habitats;
 - vi. increasing awareness of the benefits of habitat maps for policy and management purposes and gaining a better understanding of the needs of end-users in presenting mapping data.
- 3.4 The Joint Committee received a progress report in the project in March 2005 (JNCC 05 D04) and a demonstration of the newly-developed webGIS application in December 2005.
- 3.5 The data emanating from MESH are typically at a much finer resolution than that in UKSeaMap, providing a level of detail more appropriate to local management needs (such as SAC management or EIAs). As expected, the coverage of this more detailed data is very patchy, with a strong inshore bias (see Figure 2). The data from multiple sources are currently in the process of being aggregated into a single data layer which will be shown at various levels of detail suited to different scales of viewing in the webGIS (i.e. broad-scale simplified maps and fine-scale detailed maps); techniques have been developed to provide confidence ratings for each study and these will be portrayed as confidence maps.

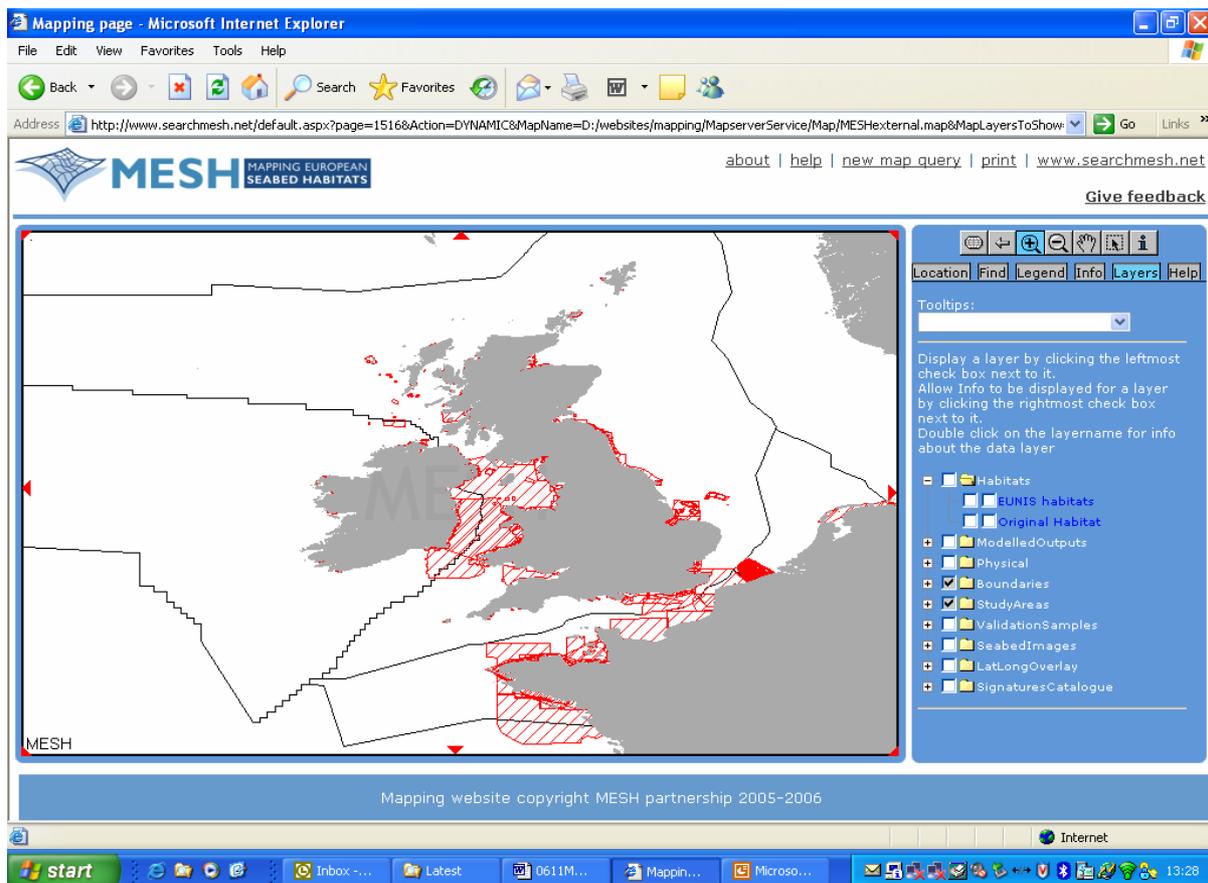


Figure 2: Screen shot from the MESH website, showing the extent of available habitat mapping studies at November 2006 (excludes modelled maps and unprocessed acoustic datasets).

- 3.6 The project is working towards completion of the data processing and preparation of EUNIS habitat maps for North-West Europe by spring 2007. The maps will also be converted to maps for Habitats Directive Annex I types and OSPAR priority habitats, together with completion of a dynamic Guidance for Mapping application and other major project deliverables by the same time.
- 3.7 JNCC has also benefited from the MESH project, through enhanced funding and collaboration with MESH Partners, to further its programme of surveys to identify possible offshore SACs.

Mapping habitats on the OSPAR List

- 3.8 JNCC has provided the lead for the OSPAR Convention since 2004 in the collation of data on the distribution of 14 habitats on the OSPAR List which require protection. Data are supplied by each OSPAR Contracting Party on the distribution of each habitat, collated by JNCC and disseminated via a specially-developed section of the NBN Gateway (funded by Defra) to show the distribution of each habitat across the north-east Atlantic (www.searchNBN.net/hosted/ospar/ospar.html).
- 3.9 The programme has been successful in establishing the first major biodiversity data collation programme for OSPAR's Biodiversity Committee and in producing for the first time an international perspective on the distribution of habitats of marine conservation importance. An example map, for the cold-water coral *Lophelia pertusa*, is shown below.

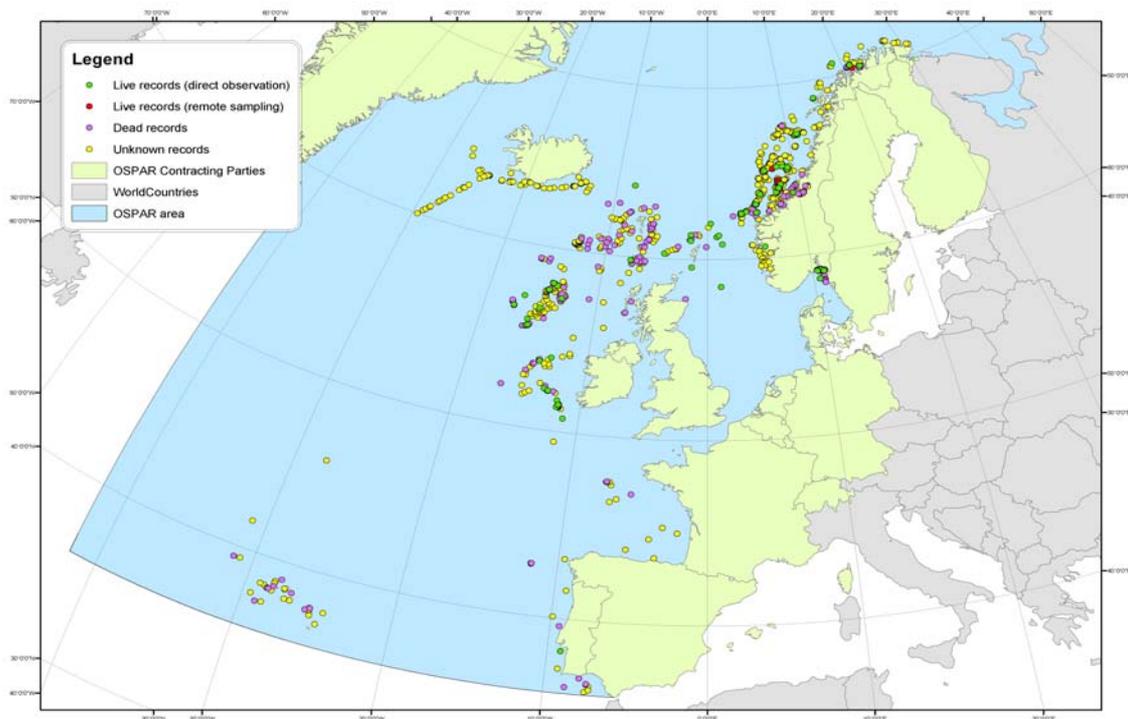


Figure 3: Map showing the distribution of the cold-water coral *Lophelia pertusa*, based on data supplied by OSPAR Contracting Parties, UNEP-WCMC and the University of Erlangen, Germany to March 2006.

4. Future needs

- 4.1 The mapping programmes are providing a national- and international-level perspective on the UK's marine landscape and habitat resource. Additionally, the more detailed data provide country agencies and others with essential information to support their local decision-making and advice. Its ready access in a consistent format via web-based GIS applications is a substantial improvement on our state of knowledge compared with 3 years ago.
- 4.2 Despite the important progress which has been made, the demand for improved knowledge in this area is considerable and will continue to grow and is, in part, a measure of the success of the current programmes. Feedback, including from the MESH UK stakeholder's workshop in October 2006, organised by Natural England, has indicated the need to:
- i. maintain the webGIS systems beyond the end of the MESH and UKSeaMap projects;
 - ii. harmonise the dissemination products by bringing together the data into a single web-delivery application;
 - iii. continue to improve the coverage of the habitat maps, by adding new data as it becomes available;
 - iv. improve the quality (confidence) of the habitat maps by replacing older data with new data collected to improved standards;
 - v. improve confidence in the modelled data (e.g. UKSeaMap) by improvements in the models, data and their validation;
 - vi. ensure the maps are user-relevant by continuing to develop means of interpreting and presenting them for a variety of policy and management applications;
 - vii. promote the collection by others of high quality mapping data, through use of the MESH standards and protocols, and its dissemination via the MESH webGIS;
 - viii. consider mechanisms to expand the MESH system to encompass other European countries;
 - ix. begin to apply the mapping data to specific policy and management needs, including its integration with management, regulatory and human activity data.
- 4.3 The following specific policy needs for the mapping information are known or expected in the foreseeable future:
- i. Habitats Directive – offshore SACs. Priority work to identify further offshore SACs is underway, with a number of new mapping surveys planned to help identify suitable sites. Whilst the new data will contribute to the existing MESH data holdings and provide improved information on offshore and deep-water habitats to further improve the habitat classification, its interpretation regarding SAC selection needs

to be informed by the existing data to help place it in a regional and national context.

- ii. Habitats Directive – Favourable Conservation Status. The UK is due to report to the EC in 2007 on the status of features listed in the Directive. For the marine habitats, the assessments are drawing upon the available data in MESH and UKSeaMap, but further work is required to more fully define the distribution and extent of the marine Annex I habitats.
- iii. OSPAR Convention – MPAs. The UK is committed to identifying further sites to contribute to OSPAR's goal of an ecologically coherent network of well-managed MPAs by 2010. This is an ambitious target for which the compilation of existing habitat data in MESH is an important contribution. It is envisaged that UKSeaMap information will play a central role in assessing suitable sites to represent the range of features in the UK, but this will need to be supplemented by information on human activities (pressures) and priority features (e.g. BAP).
- iv. OSPAR Convention – JAMP² assessments. A set of assessments of the listed species and habitats is required by 2009. As part of this, the data available in the OSPAR mapping programme will need to be supplemented with new data emerging from MESH to provide up-to-date maps for each habitat.
- v. UK Marine Monitoring and Assessment Strategy. This emerging Defra-led initiative aims to provide a framework for all UK marine monitoring requirements, to ensure it more effectively delivers both statutory obligations and future state of the seas assessments. The last status assessment (*Charting Progress*, Defra 2005) highlighted the difficulty in undertaking the assessment through a lack of seabed maps and associated biodiversity data, issues the UKMMAS will aim to redress. The strategy will need to draw upon the national ecological maps (UKSeaMap) and the more detailed MESH data to help ensure monitoring stations are distributed in a more ecologically-relevant manner.
- vi. Marine Bill – marine spatial planning. It is expected that marine spatial planning mechanisms will be introduced in the prospective Bill; whilst the precise nature of requirements is as yet unknown, delivery of an ecosystem-based approach to management should be facilitated through the availability of the marine landscape and habitat maps.
- vii. EC Marine Strategy Directive. This Directive is currently in final drafting stages and is expected to require an initial assessment of the state of the marine environment in about 2011. This will include the provision of information on the range of marine habitats present in each Member State, and further details and maps for habitats of conservation importance. Such reporting for the UK should draw

² Joint Assessment and Monitoring Programme

heavily on MESH and UKSeaMap outputs, but will need to be up-to-date at the time of the assessment.

5. Delivering against future requirements

- 5.1 Both MESH and UKSeaMap have secured external funding to continue over the next year, and with internal resources released from the MESH project it is proposed to start a new project with the released funding to focus on delivery and use of mapping information to meet the policy drivers described in Section 4.3. Beyond FY0708 external funding ceases, leaving uncertainty in how the work described in Section 4.2 can be progressed. The plans are as follows.
- 5.2 MESH – an application to Interreg to extend the project for about one year (to March 2008) has recently been successful. The JNCC contribution to this will include:
- i. continuing to act as Lead Partner to coordinate the project;
 - ii. continuing to maintain and enhance the mapping data, supplementing it with modelled data for some habitat types where necessary;
 - iii. promotion of the outcomes of the project (e.g. maps, guidance on survey standards and techniques) to help ensure wide take up of the project's results;
 - iv. undertaking a survey of deep-water canyons in the south-west approaches as a potential SAC;
 - v. development of a follow-on strategy, including how to maintain the mechanisms for collating and updating the web mapping system.
- 5.3 The project extension will be at a reduced level of resourcing compared to the past three years. The canyons survey is in an environment (deep-water and distant from the coast) which is challenging new territory for JNCC; it will be undertaken on the basis of 50% funding from Defra and 50% Interreg funding and will benefit from available expertise, ship time and equipment from other MESH partners.
- 5.4 UKSeaMap – Funds remain from the original provision made available by the funding consortium and, subject to the UKSeaMap Project Steering Group approval, will be used during 2007/08 to help improve the quality, resolution and confidence of the marine landscape maps.
- 5.5 To take forward other key aspects identified above, a new project – *Maps for ecosystem assessment and management* – is planned to begin next financial year, with a particular focus on development of mapping information to support the range of policy drivers identified above. Initially, the focus of the project is expected to be on:
- i. completion of maps for priority habitat types (Annex I, OSPAR, BAP);

- ii. assessment of needs for spatial data required to identify sites to contribute to the OSPAR MPA network;
- iii. an assessment of the data needed on human activities (pressures), its potential sources and availability, with a view to integrating such data with the environmental data and habitat maps to aid the identification of MPAs, and the assessments of ecosystem health;
- iv. use of mapping data to help formulate a strategic approach to monitoring and assessment of the marine environment (to contribute to UKMMAS and the OSPAR JAMP).

6. **Opportunities for external funding**

- 6.1 The scale of the marine environment and our current, still limited, understanding of the character and state (quality) of its marine habitats, together with the number of policy drivers requiring information and assessments, remains a significant challenge. Expectations in the future will focus on the provision of assessments, both of specific habitats (e.g. Favourable Conservation Status under the Habitats Directive) and the wider environment (Marine Strategy Directive, OSPAR JAMP), and these are at present very poorly developed for biodiversity issues (compared with comparable procedures for contaminants and eutrophication). Meeting these challenges will require working in partnership with other UK organisations and with other European countries to build solutions which are compatible across countries.
- 6.2 Recent experience from the MESH project has illustrated the substantial benefits of working in such partnerships, in gaining a common understanding of particular issues and working towards joint solutions. Such collaborative working brings additional resources and expertise to supplement and complement the work of JNCC.
- 6.3 There are opportunities in the coming year to seek new collaborative funding through the EU mechanisms (Interreg and FP7) and JNCC is well placed to develop proposals with a range of UK and European partners. It is recommended these opportunities be considered, provided any proposals are in line with JNCC strategic direction, will complement existing priorities (e.g. the offshore SAC work) and will directly help meet our wider needs for protection of the marine environment. Additionally, opportunities may arise from discussions with UK stakeholders during MESH work in 2007 to establish the resources needed to maintain the mapping mechanisms developed by MESH.
- 6.4 If external funds do not become available, a more modest core programme will be undertaken within existing internal resources, as set out in the draft Corporate Plan and as outlined in Section 5.