

#### 4. DATA COLLATION AND MAPPING

43. The purpose of the data collation and mapping tasks undertaken by the Pilot was to provide the other tasks with the necessary level of information to enable their satisfactory completion. At the outset, three basic assumptions had been made about the availability and handling of data. These were that:
- i. the Irish Sea had been well studied in the past so there would be a relatively high level of relevant information available, although for some sectors (e.g. recreation and tourism), difficulties in obtaining collated information could be expected;
  - ii. much of the information would be held by organisations participating in the Pilot, or would be in the public domain through published papers and reports; and,
  - iii. the best way to hold and manipulate the information would be via a desktop GIS which would facilitate mapping and enable the analysis of data by relating datasets spatially to one another.
44. The most important uses of Irish Sea data were expected to be:
- i. to enable the identification and biological characterisation of marine landscapes;
  - ii. to apply the draft UK criteria for the identification of nationally-important habitats and species;
  - iii. to identify areas in the Irish Sea with high biodiversity or which are otherwise particularly important for nature conservation;
  - iv. to explore relationships between the distribution of important nature conservation features and the nature and intensity of human use of the Irish Sea;
  - v. to help disseminate the outcomes of the Pilot through map-based products.
45. At the commencement of the Pilot, it was far from clear which elements of the mass of Irish Sea information potentially available would actually be needed for the work. There was no wish to expend resources on the collation of quantities of data that would not be used subsequently. There was, therefore, a need to carry out a prioritisation exercise early on in the data collation process, and to concentrate effort on acquiring and mapping the priority datasets identified through that process.

#### Method

46. Preliminary work was undertaken to identify the occurrence, ownership, availability and format of relevant datasets, and to identify priority datasets from those potentially available. Factors which guided the acquisition of physical, hydrographical and biological data were:
- i. the probable utility of the data for the purposes outlined in paragraph 44 above;
  - ii. the geographical coverage of the data within the Irish Sea, since data covering wide areas are more useful for analytical purposes than data relating to limited areas;
  - iii. the format, cost and ownership of the data, and the degree of difficulty of conversion required;
  - iv. whether similar data were likely to be available for other Regional Seas, since the Pilot needed to develop methods that could be used in other sea areas.

47. Similar factors were used to prioritise data on natural resources and human uses of the Irish Sea together with two other factors, namely:
  - i. the probable importance of a particular human activity in relation to conservation interests;
  - ii. whether the data would help in identifying how people use the Irish Sea and hence help to define the importance of sectoral interests, or which could be used to underpin spatial planning or other means of regulating human activity strategically.
48. Following the completion of the work to identify data priorities, discussions were held with organisations which owned the most important datasets with a view to the Pilot acquiring the data or access to the data. Some datasets had to be purchased, some licensed, others compiled under contract.
49. A dedicated high specification GIS workstation was purchased to meet the Pilot's data management, analysis and presentation requirements. Although other widely-used proprietary GIS software would probably also have met the needs of the Pilot, ArcView8 software from Environmental Systems Research Institute was selected because it was considered to meet the Pilot's technical needs and because technical support for this system was already available within JNCC.

## Results

50. A base map for the coastline, and the 3, 6 and 12 mile limits for the UK, Ireland and the Isle of Man, was a necessity for the Pilot. Coastline data has to be sufficiently detailed to allow display at a wide range of scales; 1:10,000 or less is required for local spatial planning decisions, while 1:2,500,000 or greater may be appropriate for matters which relate to the Irish Sea as a whole. There were problems with the preparation of an adequate coastline dataset. Detailed coastline data were not available for Ireland or the Isle of Man. For the UK, the Ordnance Survey uses mean high water for its coastline, but this differs from the UK Hydrographic Office and British Geological Survey (BGS) high water coastlines, creating a mismatch between datasets. To resolve this, a pragmatic approach was adopted in which a new dataset was compiled using a variety of sources at the best scale available. This involved merging datasets from the Ordnance Survey and the Marine Institute of Ireland.
51. Hydrographical data (including data on water temperature, salinity, currents and frontal systems) were provided at no cost by the Proudman Oceanographic Laboratory, the British Oceanographic Data Centre and the Plymouth Marine Laboratory. Examples of such hydrographical data are the data for sea floor temperature in winter shown in Map 1. These hydrographical data were used in the definition of certain seabed marine landscapes and also in the definition of water column types. The data used were modelled data and required considerable manipulation.
52. Bathymetry (Dig Bath) and seabed (Dig SB250) data were obtained under licence from the BGS in the format of ArcView8 compatible files. Examples of these data are those for the bathymetry of the Irish Sea shown in Map 2. These data, combined with bed form and slope data, were of great utility in the definition and mapping of marine landscapes.
53. Data on vertebrates were obtained from a number of sources, including CEFAS (commercial fish), JNCC (seabirds), JNCC, Sea Mammal Research Unit and SeaWatch Foundation (cetaceans), and the Marine Conservation Society (basking sharks). Data on seals were obtained from a number of sources. These data varied in quantity and distribution, frequently becoming scarce away from the coast.

54. Data on benthic communities were collated from a wide range of sources. The Marine Nature Conservation Review database held by JNCC formed the principal component of the inshore data, with additional information being provided through MarLIN (the marine component of the National Biodiversity Network), the Countryside Council for Wales, universities and research institutions. The Irish BioMar data were made available. Map 3 shows the distribution of benthic community data records available from these sources. As can be seen from Map 3, while high density data are available for coastal and inshore locations, the data for offshore areas were much more sparse. The reasons for this are that most data have been obtained by organisations having primarily coastal interests, that offshore data are more expensive to obtain than inshore data, that there has been insufficient co-ordination to ensure that surveys have been carried out systematically across the Irish Sea, and that some data holders did not make their data available to the Pilot. These issues are considered in more detail later in this Chapter.
55. Data on the distribution and relative intensity of fishing effort were obtained from Defra and the Scottish Fisheries Protection Agency. These data were derived from aerial surveillance, and CEFAS assisted in their analysis. CEFAS also mapped the fishing grounds to complement the surveillance data and achieve a more comprehensive view of fishing activities; the results of this analysis are shown in Map 4. Information on sites licensed for mariculture purposes was obtained from a range of Governmental sources.
56. Spatial data on ports, shipping routes and shipping intensities for the Irish Sea were purchased from Anatec UK Ltd in GIS format. Examples of these data are the data for the main Irish Sea shipping routes shown in Map 5.
57. Spatial data on the oil and gas industry were obtained in GIS format from the UK Digital Energy & Atlas Library (UK DEAL) website. These included maps of the oil and gas fields, the location of wells, pipelines and surface structures. UK DEAL is regularly updated and linked to the Department of Trade and Industry oil and gas website. The data are freely available and UK DEAL is a good example of a one-stop shop for sectoral GIS data.
58. Data on renewable energy development, including on current proposals, were obtained from the Crown Estate, Department of Trade and Industry, Department of Communications, Marine and Natural Resources (Ireland) and from work carried out by the Irish Sea Study Group.
59. Data on sand and gravel extraction, including areas licensed in the UK sector of the Irish Sea, and on actual dredged areas, were provided by the Crown Estate and the British Marine Aggregate Producers' Association.
60. Data on coastal land use, including on the location and population size of coastal settlements, major existing and proposed coastal developments with direct linkage to the Irish Sea, and Food and Environment Protection Act consents were obtained from a variety of sources. Settlement locations and sizes and population data were obtained through a contract with BMT Cordah. Food and Environment Protection Act data were obtained from Defra. An example of these coastal land use data are the data for coastal settlements shown in Map 6.
61. Information on submarine cables was obtained on licence from Global Marine Services in GIS format.
62. Information on coast defence and flood defence structures in England was obtained from the Defra/Environment Agency Flood and Coast Defence Asset database, in GIS format. Data for Scotland were provided in the form of paper maps. It did not prove possible to obtain similar data for Wales or Ireland.
63. As expected, data on the range of tourism and recreation activities were found to be limited and patchy. Some data on water sports such as sailing and on marinas were acquired from the Royal

- Yachting Association and from the Irish Sailing Association. Data on the location of EU Bathing Waters and of Blue Flag beaches were provided by the UK and Irish environment agencies.
64. Data on the locations of waste water and industrial discharges, together with information on the levels of treatment and riverine inputs of nutrients, were obtained from the UK and Irish environment agencies.
  65. The distribution and classification of military practice and exercise areas (PEXA) were purchased as an ArcGIS dataset from Metoc who maintain the data with the UK Hydrographic Office. The dataset includes military vessel exercise areas and firing and bombing ranges. Fisheries Research Services provided data on the Beaufort's Dyke munitions dump.
  66. The locations of spoil disposal sites were provided by Defra/CEFAS for the UK, and by the Department of Communications, Marine and Natural Resources for Ireland. Food and Environment Protection Act consent locations for capital and maintenance dredging operations were also obtained.
  67. Information on the locations of statutorily-protected nature conservation sites was obtained from the nature conservation agencies; information on the locations of wrecks and Scheduled Ancient Monuments from the statutory heritage agencies, and on areas closed for fishing from fisheries departments and Sea Fisheries Committees.
  68. About a third of all the data were obtained in GIS format requiring a minimum of manipulation. A further third were provided in Excel or Access databases requiring conversion, interpolation or reclassifying, and the remainder were supplied in paper form and were digitised for GIS.
  69. Investigating data availability, ownership and format, acquiring the priority datasets from the data owners, and converting the non-GIS data to GIS form, all proved time-consuming. Furthermore, the resultant data are incomplete in their coverage of the Irish Sea.
  70. ArcView8 proved suitable for most of the Pilot's data analysis and mapping requirements, although some data conversion required the 'Spatial Analyst' extension. The final datasets (shape files) can be viewed using the free ArcExplorer package. ArcGIS was found to integrate well with Microsoft Access databases, and, through Access, with Microsoft Excel spreadsheets. Transfer of files between GIS software, specifically from Map Info, to ArcGIS was found to be straightforward.

## Discussion

71. **Better co-ordination:** While the concentration of data collection effort by organisations in order to meet their specific operational needs is quite understandable, the relative absence of strategic or co-ordinated data collection for the Irish Sea (as evidenced by the benthic community data) is a major constraint on effective environmental management and spatial planning. Furthermore, because offshore survey is relatively expensive, a greater degree of collaboration between organisations in data collection, for example in the use of vessels and equipment, would help to reduce survey costs.
72. **Data availability:** There is great variation in the availability of information in relation to natural resources and human activities. Much information is available from Government Departments and agencies, for example oil and gas related data held by the Department of Trade and Industry. In contrast, for shipping and navigation data this did not appear to be the case, and recourse had to be made to the private sector for this information. For tourism and recreational activities, a key sector for the Irish Sea economy and employment, and a sector which can be expected to grow further in the future, the collection and collation of data appeared insufficiently co-ordinated.

73. Significant environmental data which had been collected with public funds were not made available to the Pilot for various reasons. These included the fact that the data were not held in a suitable format, and also the wish to avoid placing the data in the public domain. Other data had to be purchased or licensed from publicly-funded bodies, (using the Pilot's public funds). The argument that it is in the public interest for environmental data collected with public funds to be placed in the public domain, and not withheld or charged for, appears very strong.
74. Some data collected for the purposes of environmental assessment and held by the private sector were withheld from the Pilot because they were considered to be commercial-in-confidence. Potentially, this practice leads to unnecessary duplication of survey and for decisions to be made taking only a proportion of collected data into account. This would appear to run counter to the public interest.
75. In contrast, initiatives such as UK DEAL and the National Biodiversity Network are examples of current good practice in placing environmental, human activity, and regulatory decision data in the public domain where it can be used to support a wide range of activity and also to help regulate that activity in the public interest.
76. **Metadata:** Metadata (which show when, where, why, how and by whom the data were collected and to what standards) were generally not readily available for most biological and human activity data obtained by the Pilot. This has the effect of limiting the value of the data quite significantly.
77. The Pilot confirmed the findings of the Marine Environmental Data Group of the Inter-agency Committee on Marine Science and Technology (IACMST), who are undertaking a data strategy study as summarised in their draft report *Marine Data and Information - Where to now?* We look forward to the final stages of the study refining and clarifying their proposed UK strategy. The study followed a request from Defra to IACMST to look at the scope for better integration of mapping information about the marine environment.

## Recommendations

78. The following recommendations are made with respect to coastal and marine data matters.

**R2 A standard electronic marine and coastal map/chart base should be established, extending seamlessly across the coastline, which can be used at a range of scales from the Regional Sea (1:1,000,000 or less) to local level (1:10,000 or greater). Consideration should be given to a strategic funding mechanism to enable the necessary harmonisation.**

**R3 A national marine information network should be established, based on harmonisation rather than integration. There is likely to be a key role for a number of institutions and bodies having the capability of managing data in the long-term, and providing public access to it, each managing and providing access to specific datasets to common standards. Data standards should be developed, where possible jointly with the other countries bordering Regional Seas and with the European Union, in order to facilitate the establishment and operation of this system. A mechanism to co-ordinate this will need to be established.**

**R4 All marine data collected with public funds, or as a consequence of Government or Public agency contracts, should be held electronically to agreed formats and standards and placed in the public domain within specified timescales. These data should be contributed to a national marine information system once established. Public funds made available to universities, research institutes or other organisations should be subject to these conditions.**

**R5 Environmental data collected by the private sector for the purpose of complying with a regulatory procedure (e.g. for Environmental Impact Assessment) should be collected to agreed formats and placed in the public domain within specified timescales.**

**R6 Improved co-ordination of data collection activities needs to be achieved, including in relation to research activities, in order better to meet the needs of society and to make the most efficient use of available resources. This should include much clearer identification of the specific data collection responsibilities of public bodies. In the UK, Defra should take the lead in developing improved co-ordination, including in relation to liaising with neighbouring countries. A greater degree of collaboration between survey organisations should be promoted and encouraged.**

**R7 Information on the sources, availability, extent and attributes of datasets (comprehensive metadata) for the marine environment needs to be easily and widely accessible.**

79. A full report on Data Collation and Mapping, including details of the datasets acquired in the Pilot, is available (Lumb *et al.*, 2004a, and online at [www.jncc.gov.uk/irishseapilot](http://www.jncc.gov.uk/irishseapilot)).