DTI Strategic Environmental Assessment Area 6 (SEA6) Geological Metadata

Continental Shelf & Margin Programme
Report CR/02/287
DTI Strategic Environmental Assessment Area 6 (SEA 6) Geological Metadata

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Key words

DTI, SEA6, Irish Sea, Cardigan Bay, St George’s Channel, geology, sediments, environment, GIS, metadata

Bibliographical reference


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Contents

1. Introduction ........................................................................................................... 1

2. Synopsis ............................................................................................................... 2

3. Methods
   3.1 Keywords used in searching the bibliographic databases ...................... 4
   3.2 BGS scope of data .......................................................................................... 5
      3.2.1 BGS data (data sources in brackets) ......................................................... 5
      3.2.2 Non-BGS data ........................................................................................ 6
      3.2.3 University College Cork, Department of Geology and
          Environmental Research data .................................................................. 7
      3.2.4 United Kingdom and European metadata (Section 4) ....................... 7

4. Sources of metadata ............................................................................................ 7

Figure 1 Division of sea areas for strategic environmental assessment ............ 1

Appendix 1: Synopsis of seabed morphology and recent sedimentary processes .................................................................................................................. 11
Appendix 2: Endnote© file with references ............................................................. 14
Appendix 3: UK-Irish Border Public Domain Geological Survey MetaData
Final Report. Compiled by: Dr Andy Wheeler ...................................................... 40
1. Introduction

This report describes work carried out under commission to the Department of Trade and Industry to compile an inventory of geological metadata for area SEA6 that may be applied to strategic environmental assessment. The area of SEA6 covers the eastern Irish Sea, Cardigan Bay, and the St George’s Channel (Figure 1). In accordance with the contract conditions, the database of publicly available data has been compiled in Endnote© format and produced on a compact disc (Appendix 1). It is based on the contractors’ experience of work on geological interpretation of the area together with an extensive on-line literature survey.

Figure 1 Division of sea areas for strategic environmental assessment

The objective of the programme of research is based on the following questions:

1. What is the scope of data (published and unpublished references and data archives)?
2. Where is the original data stored?
3. What is the data quality?
4. How do we access data (include issues of costs and licensing)?
5. Brief narrative report geology and geological processes.
This report was completed November 2002 and is complemented by a report completed August 2003 for data overlapping from the UK sector of SEA 6 and SEA7 into the Irish sector (Wheeler, A. 2003. UK-Irish border public domain geological survey metadata. (Cork: University College, Department of Geology and Environmental Research )).

2. Synopsis

The area SEA6 is an almost completely enclosed sea that lies between Britain and Ireland. In the north the outlet is through the narrow North Channel between the Southern Uplands and Ireland, whereas in the south there is a broad outlet into the Celtic Sea. Water depths are up to 160m. Early sedimentary basin formation took place in the Palaeozoic and during the Mesozoic approximately 10 kilometres of sediments accumulated in a subsiding basin, one of the thickest sedimentary accumulations known on the United Kingdom shelf. There are up to 400m of Quaternary sediments underlying the St George’s Channel and seabed sediment grades from gravel to mud.

There is a wealth of geological data for SEA6, although much of this is subsurface information on bedrock geology and structure. There is a considerable database of published articles on recent sediment distribution in the area as well as sedimentary processes now operating. Appendix 1 reviews the seabed morphology and recent sedimentary processes in relation to the modern seabed environment.

Regarding subsurface and sedimentary geology, there has been a comprehensive programme of research undertaken by the British Geological Survey, in association with Universities such as the University of Wales at Aberystwyth, as part of its remit to map the continental shelf during the 25 year Department of Energy contract that ran during the 1970’s to 1990’s. The objective of this contract was to provide published solid geology, quaternary geology and sediment distribution maps at 1:250,000 scale for the UK shelf. The area SEA6 is fully covered by this programme of research. In addition the culmination of the programme was a series of offshore reports describing the geology of the area SEA6. The relevant reports are referenced as Tappin et al., 1994 (Cardigan Bay and Bristol Channel) and Jackson et al., 1995 (East Irish Sea). The reference lists from both of these publications are included in the Endnote® database provided. The mapping scale used by BGS in the offshore programme was at 1:100,000. Therefore each 1:250,000 scale map is composed of four 1:100,000 scale maps. At 1:100,000 scale the maps provide data on seismic traverses, sample locations and interpretations of the seabed sediments and seabed geology. The maps are available from the BGS as noted in the sources of metadata below, subject to Intellectual Property Rights (IPR) and cost of copying. BGS published data (reports and maps) are available at cost and identified as high quality (5) in the review carried out in Endnote®.

The BGS hold non-BGS reports submitted or donated by commercial companies and Universities. There are almost 300 items in this collection. Some of this data is held in confidence. If required, the BGS would identify the owner to DTI. Other items are available at cost, subject to IPR constraints.
As well as the BGS publications there are numerous peer-reviewed papers published in scientific journals. These papers are also referenced in the Endnote© database and carry a (3) or higher category rating.

In the area SEA6 much sub-seabed data has been acquired by oil companies during periods of exploration. As is well known there are producing gas fields in the East Irish Sea. There are (non-commercial) oil finds in Cardigan Bay and the St George’s Channel. There are many special publications on the theme of hydrocarbons (e.g. Croker and Shannon, 1995; Meadows et al., 1997 and Shannon et al., 2001) that contain peer-reviewed articles on the geology of the area. There are numerous other articles that have been published in peer-reviewed scientific journal and these carry a quality rating of 5.

Whereas the subsurface data may not be of immediate interest to this report, it should be noted that site-survey data acquired as part of the oil exploration may have a use in environmental assessment. There are a number of site-survey reports held at BGS, but most of these are confidential so that individual companies would have to be approached if access was required. There may be cost involved in this instance.

There are a number of metadata sites included in the report, not all of which have been reviewed in detail. However, it is considered likely that these sites may contain data of relevance to the present DTI project. Notwithstanding, there is a new project, recently set up by the Joint Nature Conservation Committee called ‘The Irish Sea Pilot’. The objectives of the project are to trial a proposed new marine nature conservation framework in the Irish Sea, involving English Nature, Scottish Natural Heritage, Countryside Council for Wales and Environment and Heritage Service (N.I.). An essential aspect of the project is the setting up of a GIS. The web site for this initiative is appended.

3. Methods

Along with previously accumulated personal bibliographic data sets, five online databases were searched in order to compile the inventory. Although this report deals with the environmental geology of SEA6, the contractors also compiled inventories of contamination for SEA6 as well as contamination and geology for areas SEA7 and SEA8. To avoid duplication of effort, searches were carried out to cover both subjects in all three areas and the retrievals later sorted into separate Endnote© libraries for geology and the contamination of water and sediments in sea areas 6, 7 and 8. Searches were carried out on the basis of geographical and subject matter keywords (see 3.1 below).

Online bibliographic databases searched for journal, thesis and other references were:
Web of Science,
GeoRef,
GeoArchive,
Zetoc and
Aslib

Each search was repeated with all five databases, because they appear to hold slightly different collections of references.
The **Web of Science** online data set provides web access to ISI Science Citation Index, Social Sciences Citation Index, Arts and Humanities Citation Index, and Index to Scientific and Technical Proceedings.

The **GeoRef** online database, established by the American Geological Institute, has 1.9 million bibliographic references across all geological subject areas. The North American literature has been indexed from 1785 onwards, and other areas from 1933. Journal articles, books, conference volumes, reports, maps etc are all covered. It is particularly good for searches of the geological journal literature.

**GeoArchive** is an online bibliographic database covering all types of information sources in geoscience, hydrosience, and environmental science. The database is produced by Geosystems (UK) and is provided online by Oxmill Publishing.

**Zetoc** provides Z39.50 compliant access to the British Library Electronic Table of Contents. It covers the 20 000 most heavily requested journal titles from the British Library, and 16 000 conference proceedings per year. It contains 15 million items and is updated daily. Items are added within about 3 days of receipt. The database covers from 1993 onwards.

**Aslib** consists of bibliographic records with abstracts, where available, for UK theses of all types and subjects. It covers theses accepted from years 1970 to 1999 and is the online equivalent of the printed index from volume 21 to 48 and parts 1-3 of volume 49.

**Endnote** has inbuilt import filters for Web of Science and GeoRef and, using the import filter manager, completed searches from these databases load easily and straightforwardly into Endnote®, after downloading and saving as text or word documents. For GeoArchive it was necessary to create an Endnote® import filter, which was then saved within the Endnote® program filter collection to enable successful imports of the saved, tagged, word documents downloaded from searches. Zetoc was searched from within the Endnote® programme using the ‘connect and search’ function, enabling references to be loaded straight into the Endnote® library ready for manual filtering of relevant material. Individual records retrieved from the Aslib database were copied and pasted into a separate document to enable manual entry into the relevant Endnote® library.

An Endnote® output style was created to provide output in the same format as that specified in the contract for an Excel spreadsheet. For the Notes section of the output, journal articles are generally considered to be free and the data quality to be high (ranked 3 or higher). Where appropriate, journal articles have specific Notes attached.

### 3.1 KEYWORDS USED IN SEARCHING THE BIBLIOGRAPHIC DATABASES

<table>
<thead>
<tr>
<th>Irish Sea</th>
<th>North Channel</th>
<th>Sellafield</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liverpool Bay</td>
<td>Mersey Estuary</td>
<td>Cardigan Bay</td>
</tr>
<tr>
<td>Solway Firth</td>
<td>Ribble Estuary</td>
<td>St George’s Channel</td>
</tr>
</tbody>
</table>
Appendix 2 comprises a list containing references in Endnote© format.

3.2 BGS SCOPE OF DATA

BGS data sets comprise both BGS-acquired data and non-BGS-acquired data. There may be licensing issues for the BGS use of non-BGS data (e.g. Hydrographic Office sonar and bathymetric data) and/or with issue of BGS interpreted data where intellectual property rights is owned by others (e.g. BGS digital bathymetry, seabed sediment, geochemical data).

3.2.1 BGS data

Regional Offshore Reports (bibliography held in Endnote©) available at cost.
Non-confidential BGS reports likely to be released at cost of reproduction (grey literature).

Geophysical Survey data (data source from ORACLE database) including:
- Regional surveys - sub-seabed
  Profile/sub seabed/seabed
  Air gun
  Sparker
  Boomer
  Pinger
- Regional surveys - Seabed only
  Sidescan sonar
  Swath bathymetry
  Swath back scatter
  3D seabed returns

Sampling surveys
- Regional surveys
  Sub-seabed (seabed secondary objectives)
    Gravity core or similar
    Vibrocore
    Drill

November 2002
Seabed (sub-seabed secondary objective)
  Grab
  Seabed photographs

Published maps (available at cost)
  Solid 1:250 000 hard copy
  Quaternary 1:250 000 hard copy
  Seabed sediments and bathymetry hard copy
  Solid 1:1000 000 hard copy
  Quaternary 1:1000 000 hard copy
  Seabed sediments and bathymetry 1:1000 000 hard copy

Digital interpreted data
  Seabed sediments texture and mineralogy
  Bathymetry
  Geochemistry (principally inorganic) but note the overlap with the contamination of seawater and seabed sediment components of the SEA programme of work

3.2.2 Non-BGS data

Non-confidential non-BGS reports (grey literature) are likely to be released at cost of reproduction, subject to IPR constraints and where permission to copy has been obtained. These include:

Commercial site investigation reports. For well sites these would typically consist of 3x3 or 1x1km area surveyed with single- or multi-channel mini-sleeve/air-gun, sparker, pinger/boomer/echosounder, sidescan sonar, with some interpretation calibrated by core. More problematic sites may have employed seabed photography, some with AUVs.

Aggregate surveys.

University survey reports.

Hydrographic Office Series
  Sidescan sonar interpretation
  Single-beam echosounder (close survey)
  Seabed samples of various types and qualities of interpretation.
3.2.3 University College Cork, Department of Geology and Environmental Research data

Assistance to assessing the amount, whereabouts and quality of data is given in the form of a report on the areas where data overlap from within the UK side of the SEA 6 boundary to approximately 50km within the Irish border (Wheeler, A. 2003. UK-Irish border public domain geological survey metadata. (Cork: University College, Department of Geology and Environmental Research)).

3.2.4 United Kingdom and European metadata (Section 4)

Metadata data sources available on digital networks are compiled from BGS sources (Alan Stevenson). Sources are listed below with HURL sites. There are likely to be huge datasets some of which may be too limited and time consuming (costly) to be of use for environmental surveys.

4. Sources of metadata

Much of the assembled metadata is based on collections of reports, papers and other databases held at the British Geological Survey (BGS) and at the Dept. of Geology and Environmental Research, University College, Cork. These holdings have been supplemented by the literature searches outlined above.

Published BGS and University College, Cork reports and grey literature identified in the database will normally be available at BGS and Cork.

There are other metadata databases identified as potentially providing additional material, although there have been no exhaustive searches made of these. These are as follows:

- PAN-NATIONAL AGENCY/DEPARTMENT/UNIVERSITY

  - Joint Nature Conservancy Council:
    [http://www.jncc.gov.uk](http://www.jncc.gov.uk)
    With particular site:
    [http://www.jncc.gov.uk/Marine/irishsea_pilot/default.htm](http://www.jncc.gov.uk/Marine/irishsea_pilot/default.htm)
    for the new initiative ‘Irish pilot project’

  - Countryside Council for Wales:
http://www.ccw.gov.uk

- Environment and Heritage Service: http://www.ehsni.gov.uk

- NGDF National Geospatial Data Framework (includes 'ask giraffe')
  www.ngdf.org.uk

- UKMIC UK Marine Information Council www.ukmarine.org

- IACMST . The Inter-Agency Committee on Marine Science and Technology
  http://www.marine.gov.uk/
  IACMST is a UK Government Committee reporting to the Office of Science and Technology. IACMST is responsible for the Marine Environmental Data Action Group (MEDAG), which, together with the Marine Environmental Data Co-ordinator, forms the UK Marine Environmental Data (UKMED) Network. The network has set up the OceanNET (http://www.oceannet.org/) web site as a portal to data and information about the marine environment. OceanNET also contains a new UK Directory of Coastal Data Sets. UKMED is currently funded by the Defence Science and Technology Laboratory (DSTL), Department for Environment, Food and Rural Affairs (DEFRA), the Environment Agency (EA), Fisheries Research Service (FRS), the Met Office, the Natural Environment Research Council (NERC) and the UK Hydrographic Office (UKHO).

- Marine equivalent of MAGIC needed www.magic.gov.uk, with possible start provided by www.cefas.co.uk

- INTRA-RESEARCH COUNCIL/UNIVERSITY

  - www.nerc.ac.uk/data/

- INTRA-SURVEY/INSTITUTION

  - www.bgs.ac.uk BGS Intranet/Geoscience/Metadata
  - SOC http://www.soc.soton.ac.uk/cgi-bin/seadog/seadog.pl
  - List of searchable Databases (in addition to SOC SeaDOG) that contain references to cruises within the Area of SEA6
List of Sampling Databases. There are too many samples of many different type and age outside of BGS to make a sensible list. The SOC boscor site was not functioning October 2002.

<table>
<thead>
<tr>
<th>Database Name</th>
<th>URL</th>
</tr>
</thead>
<tbody>
<tr>
<td>British Oceanographic Data Centre</td>
<td><a href="http://www.bodc.ac.uk">www.bodc.ac.uk</a></td>
</tr>
<tr>
<td>National Geophysical Data Centre</td>
<td><a href="http://www.ngdc.noaa.gov">www.ngdc.noaa.gov</a></td>
</tr>
<tr>
<td>European Directory of Marine Environmental Data (EDMED)</td>
<td><a href="http://www.bodc.ac.uk/frames/index4.html?../services/edmed/index.html&amp;2">http://www.bodc.ac.uk/frames/index4.html?../services/edmed/index.html&amp;2</a></td>
</tr>
</tbody>
</table>

- PAN EUROPEAN

- GEIXS (Geological Information Exchange System) [http://geixs.brgm.fr/](http://geixs.brgm.fr/)
- EU-SEASED [www.eu-seased.net](http://www.eu-seased.net). The EU-SEASED website consists of metadata from the following EC 4th and 5th Framework projects
  - EUMARSIN (European Marine Sediment Information Network)
  - EUROSEISMIC (European Marine Seismic Metadata and Information Centre)
  - EUROCORE (A searchable Internet database of seabed samples from the Ocean Basins held at European Institutions)
- SEASEARCH (Gateway to Oceanographic and Marine Data & Information in Europe) [www.sea-search.net](http://www.sea-search.net). Includes:
  - EDMED (European Directory of Marine Environmental Datasets)
- PANGAEA [http://www.pangaea.de/](http://www.pangaea.de/)
  PANGAEA is a public data library on the Internet aimed at archiving, publishing and distributing geocoded data with special emphasis on environmental, marine and geological research. It is operated by the Alfred Wegener Institute for Polar and
Marine Research and the Centre for Marine Environmental Sciences at the University of Bremen.

References


APPENDIX 1

SYNOPSIS OF SEABED MORPHOLOGY AND RECENT SEDIMENTARY PROCESSES

The area SEA6 is an almost completely enclosed sea lying between Britain and Ireland. In the north the outlet is through the narrow North Channel between the Southern Uplands and Ireland, whereas in the south the outlet is into the Celtic Sea. In the north, in the eastern Irish Sea, water depths are mainly less than 100m. However, west and south of the Isle of Man, the Celtic Trough is a deeper water feature that continues southward into the St George’s Channel and the Celtic Sea, where water depths reach a maximum of 160m.

The present seabed morphology and sediment distribution is due mainly to glaciogenic processes operating over the past several 100,000 years. Five bathymetric zones are recognised (Tappin et al., 1994; Jackson et al., 1995):

1. Coastal embayments: 50% intertidal and up to 10m deep formed during the Holocene sealevel rise (Eyles and McCabe, 1989).
2. Inner Shelf platforms: up to 100km in width in the East Irish Sea with gentle gradients of 1:100 to 1:2000. Water depths are mainly up to 60m, except in the south where there are depths of 100m. The platforms formed at times of lowered sealevel during the last (Weichselian) glaciation.
3. The Celtic Trough: a linear feature that runs from west of the Isle of Man to the Celtic Sea. Water depths are generally at 110m but are as great as 160m, and seafloor gradient is subdued (1:50). The origin of the trough is problematic, although it is not structural. It is an erosive feature, almost certainly formed at lower sealevels associated with glacial maxima, probably during the mid or early Pleistocene (Eyles and McCabe, 1989).
4. Rocky prominences: mainly areas of rough seabed topography, found in: coastal embayments where they are represented by rocky headlands or shoals; on the inner shelf where they are islands and shoals; and where sedimentary rocks are exposed at seabed. Those at less than 25m water depth were formed during the Holocene transgression (Eyles and McCabe, 1989).
5. Enclosed deeps: less than 5km wide, up to 30km long and 10 to 50m deeper than the surrounding sea floor. Gradients are less than 1:10. They are found on the inner-shelf platform and within the Celtic Trough. They formed as kettle holes during the early Holocene (Eyles and McCabe, 1989).

Seabed sediments range from gravel to mud, and two units (layers A and B) are recognised as being actively involved in the present-day hydraulic regime (Pantin and Evans, 1984). Layer A is the mobile sediment, with a patchy distribution. It comprises mud, sand and gravel grade and over much of the area is up to 0.3m thick. In the East Irish Sea there is a general transition southeast and east from the Isle of Man and towards the coast from coarser-grained gravel and sand to mud that forms a mud belt, termed the Western Irish Sea Mud Belt (Belderson, 1964). Within the sandy and gravelly areas, there are extensive fields of sand ribbons and sand waves as well as barchan dunes. Sediment in these sand and gravel areas is
Layer B underlies Layer A and comprises a relict deposit of gravel and sand, often a pebbly (shell) coquina or gravel. It is generally up to 0.2m thick. Where Layer A is absent Layer B is part of the active system and the fine-grained component is being winnowed and removed.

Off the Welsh coast there are relict glacial outwash features termed Sarns.

The controls on the present day sedimentation regime include climate, tidal currents, bathymetry, sediment input and distance from source. The climate is temperate with a dominance of westerly winds, with those above Force 8 recorded between 35 and 45 days per year. The exposure of the southern part of the area to the open ocean in the south ensures abundant wave action that is effective mainly along the coast, and leads to active erosion in this zone, which thereby provides a sediment source. There is a semidiurnal tidal regime with maximum surface velocities of 1.0m/s\(^{-1}\) that results in bed-load partings being located off Pembrokeshire and the Lleyn Peninsula. Thus the dominant bed-load transport direction is southward (into the Celtic Sea) and northward (into the Irish Sea) from the Lleyn/Anglesey area. There is a positive correlation between areas of maximum bed-load stress and maximum erosion. In the area of the bed-load parting off Anglesey the seabed is swept clean of sediment. The floor of the Celtic Trough is composed of coarse sand and gravel. In the east of the Irish Sea, where there is an area of slack tide, the seabed comprises mud.

Underlying the seabed sediment there are a series of sedimentary basins (Tappin et al., 1994; Jackson et al., 1995). North of Anglesey, the rocks are mainly of early and pre-Mesozoic age with a Quaternary cover up to ~100m thick. In this area there are a number of producing gas fields. South of Anglesey there are accumulations of Mesozoic rocks, which in places are over 10km thick. There is an overlying Quaternary cover up to 400m thick. There has been an active hydrocarbon exploration programme here but limited commercial accumulations have as yet been discovered.

References


APPENDIX 2

Annotated references in Endnote® format are on compact disc.

The following references are output from the Endnote format files:


Allen, P. & Rees, I. 1999. Irish Sea seabed image archive. 120 in *Marine and land based inputs to sea research seminar*. (Bangor: Detr.)


Barrow, G. 1906. The geology of the Isle of Scilly.


Eyles, N. & McCabe, A.M. 1989. The late Devensian (<22,000 BP) Irish Sea basin; the sedimentary record of a collapsed ice sheet margin. *Quaternary Science Reviews*, 8, Pt 4, 307-351.


*November 2002* 24


Morton, A.C. 1989. Heavy minerals in seabed sediments on the southern part of the UK continental shelf.


Thomas, G.S.P. 1975. A possible late Devensian marine episode in the Isle of Man and its implications for the limit of the last glaciation in the Irish Sea. unpaginated in *Europe, from crust to core; abstracts of keynote addresses and short communications*. (Reading, United Kingdom: Geol. Soc. Lond.-Univ.)


APPENDIX 3

UK-Irish Border Public Domain Geological Survey MetaData

Final Report

Compiled by: Dr. Andy Wheeler

1 August 2003

2 Dr. Andy Wheeler, 119, Ashburton, Gardiners’ Hill, Cork, Ireland

November 2002
CONTENTS

1. INTRODUCTION 3
   1.1. GEOGRAPHICAL EXTENT OF STUDY AREA 3
2. DATA SOURCES 5
3. THE NATURE OF THE DATA 7
   ...3.1. LINE DATA 7
   3.2 COVERAGE DATA 7
   3.3 POINT DATA 7
4. DATA PRESENTATION 8
5. DATA QUALITY 9
6. DATA COMPILATION RESULTS 10
   British Geological Survey Seabed Samples Database 11
   BGS Geoscience Database 12
   EU SeaSed Database 16
   Geological Survey of Ireland - National Seabed Survey 17
   Geological Survey of Ireland - Seabed Samples 18
   Irish Sea Pilot Study 19
   Regional Side-scan Sonar Surveys 21
   SWISS sediment samples 22
7. RESULTS BY CRUISE 23
   Benthos Mer Celtique 24
   Cartopep 25
   Challenger 3-85 26
   Challenger 10-83 27
   Challenger 20-87 29
   Challenger 86 30
   Charles Darwin 91a 31
   Charles Darwin 93 32
   Diaplu2 33
   Discovery 123 34

November 2002 41
Discovery 216 35
DTI Survey 1987 36
Faegas 1 Leg 1 - CH39 37
Geological Survey of Ireland - Geoman Cruise 30 38
Geological Survey of Ireland - Cruise 1/83 39
Geological Survey of Ireland - Cruise 2/84 40
Geological Survey of Ireland - Lough Beltra 4/84 41
Geological Survey of Ireland - Lough Beltra 3/85 42
Geological Survey of Ireland - 2/89 43
Geological Survey of Ireland - 2/93 44
Prospec 45
Westline 1993 46

8. BIBLIOGRAPHY 47

9. CONTACT ADDRESSES 50
1. INTRODUCTION

A significant number of research cruises concerned with determining seabed attributes (both biological and geological) have been undertaken especially since the 1970s. The survey areas of these research cruises often cross national boundaries at sea reflecting the contiguity of seabed features across borders. Correspondingly, survey results on features that straddle the border are of relevance to both countries irrespective of which side of the border the surveys were conducted.

The UK Department of Trade and Industry are performing an environmental appraisal of all UK seabed (SEA). This report is a contribution to this process and represents a review of the seabed survey and sampling metadata available from Irish waters adjacent to the UK-Irish marine border.

The metadata that is presented in this report includes details of station lists and survey lines both in tabular and map format as well as associated bibliographic references. Commercial and confidential data is not included in this report. In this context, this report mainly documents the results national and international scientific programmes.

With the bibliographic database, although every effort has been made to make this list as inclusive as possible it is likely that some reference may have been overlooked. This inevitable given the nature of the study area that defines a narrow zone often fringing main geographical areas severely limiting the usefulness of geographic search terms in bibliographic databases. It was therefore necessary to adopt an approach whereby publications were traces by association with the metadata data.

1.1. GEOGRAPHICAL EXTENT OF THE STUDY AREA

The study area for which data is presented is defined by a zone extending 50km inside Irish waters from the UK-Irish border. 50km was chosen as a generous distance that would encompass all significant geological features that straddled the border whilst maintaining a feasible data gathering exercise within the constraints of the project. Geological features straddling the border and extending more than 50km inside Irish waters are deemed to be regional in significance. Data within the Irish 12 nautical mile limit are excluded for reasons of jurisdiction. The study area includes: part of western Irish-Scottish shelf, Rockall Trough, Rockall Bank, Hatton Basin and Hatton Bank; the western Irish Sea and parts of the Celtic Sea (see Figure 1).

As the study area defines a buffer around a national boundary, it was noticed during data collection that this zone was avoided in many research programmes with Irish study focussing mainly on more central areas. On the U.K. side, a considerable number of surveys where identified as occurring on the general area but closer examination revealed that they stopped at the U.K. border and did not cross into Irish water presumably as permission for operations had not been sort. This scenario was especially true of deep water setting and particularly so for the Rockall Trough. In the Irish Sea, cross border surveys were common.
Figure 1. Area of interest representing a 50km zone within the Irish waters (stippled blue area) adjacent to the UK-Irish marine border (red line) and outside of the 12 nautical mile limit. Bathymetry from GEBCO.
3 2. DATA SOURCES

Considerable effort has been put into identifying the major cruises of the past 25 years. Dr. Andrew Wheeler has been actively involved in a number of recent cruises in the area as well as comparable data compilation exercise for Irish clients with the result that significant data was available in-house. These includes metadata holdings for the Irish Sea and Rockall Trough collected as part of various former and on-going project activity in these areas.

Nevertheless, it was prudent to widen the search. The World Wide Web also has a number of searchable databases relating to marine research activity that cover the area of interest. Those sits which proved useful for the present study are briefly described below:

The French SISMER site (see http://www.ifremer.fr/sismer/) provides concise cruise details from French cruises worldwide including coverage in the study area. Relevant details were extracted include cruise summaries and survey maps when available. Limited details are available specific sample sites and bibliographic references.

The NGDC GEODAS database documents trackline for geophysics data including side-scan sonar, refraction and reflection seismics, bathymetry etc. collected by survey vessels of a number of nationalities. The data is freely available on-line for downloading from the site (see http://www.ngdc.noaa.gov/mgg). There is also a separate NGDC database for geological core data.

The Irish Sea Pilot study undertaken by the Joint Nature and Conservancy Council (JNCC) (see http://www.jncc.gov.uk/marine/irishsea_pilot/reports_comments.htm) contains a data review of Irish Sea metadata for the purposes of developing a set of nature conservation objectives for the Irish Sea. The purpose of the conservation objectives is to define that state of the marine environment in which the characteristic biodiversity of the Irish Sea can be sustained. The overview maps presented by this study are also included here.

Sea-Search (see http://www.sea-search.net/roscop) provides online access to cruise reports and has superceded the ROSCOP cruise report facility with a digital database.

The British Geological Survey Geoscience Data Index (see http://www.bgs.ac.uk/geoindex/index.htm) shows map covering and metadata holding for UK waters but also includes limited coverage into Irish waters that is relevant to this study.

The EU-Seased database (see http://www.eu-seased.net) contains a comprehensive database of core locations and geophysical datasets in EU waters that can be searched by map. The site covers input from EU Fifth Framework programmes collating metadata (EUROCORE, EUMARSIN and EUROSEISMIC).

Furthermore, metadata was also collated through contacts in OMARC (EU 5th Framework Programme Ocean Margin Research Cluster) and the Irish Geological Survey.
4 3. THE NATURE OF THE DATA

5 3.1. LINE DATA

Various types of line data are presented. This data type potentially covers seismic reflection and refraction (deep, intermediate and shallow), gravity, magnetics, side-scan sonar (various types including GLORIA and TOBI), swath bathymetry (SIMRAD EM 300 or similar) and echo-sounding. Other imagery systems such as sea-bottom video line are also line data.

When available, the vessels cruise track is presented. It should be noted that for parts of these tracks the vessel may be in-transit and therefore not actively collecting data. Those cruises where only transit lines cross the area of interest have been omitted. Where data is collected when the data is moving, e.g. most geophysical datasets, the metadata is available as line data.

3.2. COVERAGE DATA

For seabed mapping surveys (e.g. side scan sonar and multibeam mapping), data is presented as coverages when available. In some cases, only areas of operation are available, this is particularly true to old cruises.

6 3.3. POINT DATA

Point data includes cores and short dredge samples for geological, geotechnical and biological purposes. Samples may penetrate the seabed from a few centimetres to several metres depending on the nature of the sampling gear and the purpose for which the samples was taken. Also included in point data are camera stills.
7 4. DATA PRESENTATION

Metadata has been compiled within a GIS facilitating map productions and data processing. An overview of all the data collected is presented in both map and tabular formats. Tabulated data is compiled on Excel spreadsheets.

Data was available both as details for existing data compilations (e.g. data holding for the British Geological Survey) and as individual cruises. Due to this duality in data compilation, metadata is presented both data compilations and cruise data separately.

For existing data compilations, details of the nature of database are presented as well as a overmap showing the locations of samples/geophysical coverages held in the database and finally a spreadsheet documenting the contents of the database which is included in the accompanying CD-ROM.

A similar presentation is given for individual cruise data with information concerning the nature of the cruise, a map showing the cruise track, sample stations or survey area as available and then a listing of the sample or geophysical survey metadata.

In addition a summary cruise spreadsheet is also presented which lists, where known, the programme name, ship, source of funding, cruise dates, descriptive location, coordinates, chief scientist, contact address, data types and comments.

A bibliography is presented at the end of this report.

All data presented in this report are also available on the accompanying CD-ROM.
8 5. DATA QUALITY

Data compiled for this report has been completed to the high standards possible with the budgetary and time constrains of the project. Whilst every effort has been made to make sure that no relevant data has been overlooked, it is appreciated that the possibility exists for dataset to be overlooked due to the disparate nature of the databases. Any omissions are therefore unintentional. Every effort has been made to transcribe data faithfully, however, issues of the quality of the original datasets have not been addressed. There are several aspects to this data quality issue.

Firstly, the quality of the original data acquired at the time of the survey may be variable especially for older surveys where advances in technology may make some datasets of poor quality, obsolete or surpassed by newer acquisitions. Some of the older datasets may not be digitally available or may have been poorly archived.

Secondly, older surveys based on pre satellite navigation, may have poor navigational accuracy. This may not be a problem in a general sense, but can become one when attempting to repeat sampling or line surveys in the same place some years later.

Thirdly, the collected data may have deteriorated over time. Tapes of seismic or imagery data may be unusable after 20 years and, depending on the nature of storage, physical sedimentary or biological samples may also have deteriorated or altered during storage or may have been used for analysis with no sample remaining.

Finally, purposely contains a degree of data duplicity e.g. between cruise entries and data compilation entries. Furthermore, some duplicity may also exist between different data compilation entries. No attempt has been made to rectify this as the details of the databases are presented in their entireties.
6. DATA COMPILATION RESULTS

The following are metadata search results of existing databases and data compilation exercises
British Geology Survey Seabed Samples Database

Cruise: Various
Dates: 10/01/1953 – 10/01/1996
Chief Scientist: Various
Responsible Institute: BGS, Edinburgh

Details:

Data presented is from the either the BGS’s own sampling programs, or have been supplied by other and commercial organisations and are catalogued with the BGS. Listings of locations of numbered samples from the BGS archive, with details of BGS and commercially collected material. Each entry contains a position, degree square, water depth, terminal depth and type of sampling equipment e.g. Vibrocore, grab etc. The dataset is used to archive, cross reference and facilitate access to seabed samples collected for mainly geological and other reasons. Full details of any sample are available on request at a charge. Reference by BGS No and degree sq. Note, the latter is important as numbers cycle.

(see CD-ROM:/Spreadsheets/bgs and com bedsamples wgs 84a.xls)
BGS Geoscience Database

Dates: to present
Responsible Institute: British Geological Survey

Includes seabed samples and geophysical survey lines

The British Geological Survey Geoscience Database holds details of all offshore sample and geophysical data collected and collated by the British Geological Survey that is relevant to UK offshore geology. This database also includes data that extends across the UK border into Irish waters. Note: the some of the data presented here is also reproduced elsewhere under specific cruises and also under the Geological Survey of Ireland dataholdings).

9 Seabed Samples
10 Geophysical lines
(see CD-ROM:/Spreadsheets/bgs geoscience geophysics.xls)
**EU SeaSed Database**

Dates: to present  
Responsible Institute: EU  

Includes seabed samples and geophysical survey lines  

The EU Seased database contains a comprehensive listing of seabed sediment sample locations collected in EU waters as a result of data gathering in 3 EU 5FP projects (EUMARSIN, EUROCORE and EUROSEISMIC) involving the main marine geology institutes in Europe.

11 Seabed Samples
(see CD-ROM:/Spreadsheets/eu seased.xls)
Geological Survey of Ireland – National Seabed Survey

Cruise: Various
Dates: to present

CHIEF SCIENTIST: M. GEOGHEGAN
Responsible Institute: GSI, Dublin

The Geological Survey of Ireland has completed multibeam surveying of Ireland Deep-water territories up to including areas adjacent to the UK border (3A, 3G, 3B and 3F). Datasets collected include:

Multibeam bathymetry and backscatter
Sub-bottom profiler
Magnetics
Gravity
Geological Survey of Ireland – Seabed samples

Cruise: Various
Dates: 04/01/1979 – 28/12/1994
Chief Scientist: R. Keary
Responsible Institute: GSI, Dublin

Details:
Set of records for systematic geological seabed sampling program. Original data collected during many research cruises. Data combined into Geoman archive management product by Irish Marine Data Centre. Total of 611 samples, with verbal field descriptions of sample characteristics. Locational data in Decca, subsequently plotted to latticed Admiralty Charts, and derived Geographic Co-ordinates manually entered to database (IMDC).

(see CD-ROM:/Spreadsheets/gsi bedsamples wgs 84.xls)
Irish Sea Pilot Study

Dates: August 2003
Responsible Institute: JNCC

Overview map of the Irish Sea based on metadata collections for the Irish Sea Pilot Study.
Regional Side-scan Sonar surveys

Dates: to present
Responsible Institute: Various

The following regional side-scan sonar coverages were collected in the ECOMOUND project (EU Fifth Framework) and include TTR surveys (Training Through Research – Moscow State University/UNESCO) and SOC TOBI and GLORIA Surveys.
**SWISS sediment samples**

Cruise: RVs Celtic Voyager and Prince Madoc  
Dates: 01/06/1997 – 10/11/1999  
Chief Scientist: J. Wilson? (Trinity College Dublin)  
Responsible Institute: Trinity College Dublin

**Details:**

A baseline study of the sediments of the Southern Irish Sea. Location and description of van veen grab seabed samples. Carried out as part of an extensive survey of the benthic environments of the Irish and Celtic Seas. To be combined with faunal data to aid the definition of habitat boundaries.
7. RESULTS BY CRUISE

The following metadata details refer to individual cruises that fall within the study area.
Benthos Mer Celtique

Cruise: Thalassa I - Benthos Mer Celtique
Dates: 16/06/1977 – 06/07/1977
Chief Scientist: Louis Cabioch
Responsible Institute: IFREMER

Details:

Study of the Celtic Sea in relation to ecological and grain size parameters. Data collected includes:
- Zoobenthos: identification, special and temporal distribution, community descriptions
- Physical sediment analysis
Cartopep

Cruise: L'Atalante - Cartopep
Dates: 08/06/1995– 20/06/1995
Chief Scientist: Alain Normand
Responsible Institute: IFREMER

Details:

Hydrographic mapping of the zone between 46°N and 54.5°N in preparation for future survey (Prospec1 of the Thalassa). Datsets collected include:

- EM12 Multibeam bathymetry
DTI Strategic Environmental Assessment Area 6
Geology

**Challenger 3-85**

**Cruise:** Challenger 3-85
**Dates:** 14-27.04.85
**Chief Scientist:** ?
**Responsible Institute:** SAMS

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Challenger 10-83

Cruise: Challenger 10-83
Dates: 24/07/83-06/08/83
Chief Scientist: ?
Responsible Institute: SAMS

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Challenger 20-87

Cruise: Challenger 20-87
Dates: 20-31/10/87
Chief Scientist: ?
Responsible Institute: SAMS

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Dates: 
Chief Scientist: ?
Responsible Institute: SAMS

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<td>12 16 W</td>
<td>2900</td>
<td>1 mm net. Good sample</td>
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<td>Epibenthic Sledge</td>
<td>17.11.91</td>
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<td>0.5 mm net. good sample</td>
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<td>Agassiz Trawl</td>
<td>19.11.91</td>
<td>57 18 N</td>
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<td>2220</td>
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<td>19.11.91</td>
<td>57 20 N</td>
<td>10 21 W</td>
<td>2200</td>
<td>1 mm net. Small sample</td>
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<td>21.11.91</td>
<td>56 21 N</td>
<td>09 48 W</td>
<td>1640</td>
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<td>Agassiz Trawl</td>
<td>21.11.91</td>
<td>56 34 N</td>
<td>09 31 W</td>
<td>1370</td>
<td>Good sample + wood</td>
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<td>Agassiz Trawl</td>
<td>22.11.91</td>
<td>56 36 N</td>
<td>09 17 W</td>
<td>960</td>
<td>Trawl fast. Small sample</td>
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Charles Darwin 91a

Cruise: Charles Darwin 91a
Dates: 02/03/95-22/03/95
Chief Scientist: B.S. McCartney
Responsible Institute: Proudman
Charles Darwin 93

Cruise: Charles Darwin 93
Dates: 18-27.05.95
Chief Scientist: ?
Responsible Institute: SAMS

Details:

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</table>

**DTI Strategic Environmental Assessment Area 6**

**Geology**
Diaplu2

Cruise: Cotes De La Manche - Diaplu2
Dates: 02/07/2002– 21/07/2002
Chief Scientist: Dominique Boust
Responsible Institute: IFREMER

Details:

Surface sampling of the seabed to measure plutonium concentrations and its relationships to chemical changes and processing occurring in the sediments.
Discovery 123

Cruise: Discovery 123
Dates: 05/08/81-10/09/81
Chief Scientist: J.B. Wilson
Responsible Institute: Royal Holloway University
Discovery 216

Cruise: Discovery 216
Dates: 26/08/05 – 12/09/95
Chief Scientist: P.J. Stretham
Responsible Institute: IOS, Wormley

Figure 2 Discovery Cruise 216, cruise tracks

Details:

46 CTD casts (dissolved oxygen, nitrate, silicate, phosphate, salinity, HPLC chlorophyll-a, microzooplankton biomass, aluminium, HPLC pigments, dissolved trace metals, dissolved copper)
1 box core (sediment/chemical analyses)
10 multicore (sediment analyses, chemical analyses, pore water chemistry)
9 radionuclide samples (amino acids)
3 SAPS (stand alone pumping system – trace metals)
DTI Survey 1987

Cruise: DTI Survey 1987
Dates: 1987
Chief Scientist: 
Responsible Institute: DTI
Cruise: Faegas 1 Leg 1 - CH39 (Jean Charcot)
Dates: 25/06/1973– 06/07/1973
Chief Scientist: Jean-Pierre Peypouquet
Responsible Institute: IFREMER

Details:

Geological study of core material including planktonic assemblages of microfossils. Data sets collected include:

- Bathymetry
- Sediment cores
- Dredges
(see CD-ROM:/Spreadsheets/gsi cr 2-89 wgs 84.xls)
Geological Survey of Ireland – Geoman Cruise 30

Cruise: GSI Geoman Cruise 30
Dates: 05/09/78 – 13/09/78
Chief Scientist: R. Keary
Responsible Institute: GSI, Dublin

Details:

Record of vessel track and fix plot for geological cruise. Equipment used was pinger sub-bottom profiler and echosounder. Part of fix plot record has been omitted due to ambiguous positional data.

(see CD-ROM:/Spreadsheets/gsi cr dub to wicklow dec deg.xls)
Cruise: GSI Cruise 1/83
Chief Scientist: R. Keary
Responsible Institute: GSI, Dublin

Details:
Record of vessel track and fix plot for geological cruise. Equipment used was sparker, sub-bottom profiler and echosounder. NB part of the complete vessel track has been excluded owing to presence of poor or ambiguous positional data.

(see CD-ROM:/Spreadsheets/gsi cr 1-83 wgs 84.xls)
Cruise: GSI Cruise 2/84  
Dates: 28/05/1984 – 02/06/1984  
Chief Scientist: R. Keary  
Responsible Institute: GSI, Dublin  

Details:  
Record of vessel track and fix plot for geological cruise. Equipment used was sparker, and boomer sub-bottom profilers and echosounder. Shallow seismic coverage to investigate probable presence of extensive coal deposits off the Dublin and Wicklow coasts.  

(see CD-ROM:/Spreadsheets/gsi cr 2-84 wgs 84.xls)
Cruise: Lough Beltra 4/84
Dates: 27/08/1984 – 08/09/1984
Chief Scientist: R. Keary
Responsible Institute: GSI, Dublin

Details:

Record of vessel track and fix plot for geological cruise. Equipment used was sparker seismics echosounder, and magnetometer. To carry out magnetic and sparker transects in the Carnsore area on behalf of Prof. Tom Murphy (DIAS) and (b) to carry outs sparker transects between Carnsore and the Scilly Isles. Only tracks for the Carnsore area have been made available here.

(see CD-ROM:/Spreadsheets/gsi cr 4-84 wgs 84.xls)
Cruise: Lough Beltra 3/85
Chief Scientist: R. Keary
Responsible Institute: GSI, Dublin

Details:

Record of vessel track and fix plot for geological cruise. Equipment used was seismics and echosounder. Examination of offshore continuation of host base metal deposits of Navan and midlands. Geological reconnaissance cruise to continue mapping of the near surface geology of Irish waters.

(see CD-ROM:/Spreadsheets/gsi cr 3-85 wgs 84.xls)
Geological Survey of Ireland –2/89

Cruise: GSI cruise 2/89
Dates: 02/10/1989 – 13/10/1989
Chief Scientist: R. Keary
Responsible Institute: GSI, Dublin

Details:
Record of vessel track and fix plot for geological cruise. Equipment used was single channel seismics (sparker) and echo sounder. Reconnaissance geological investigations.
Geological Survey of Ireland –2/93

Cruise: GSI cruise 2/93
Dates: 23/09/1993– 02/10/1993
Chief Scientist: R. Keary
Responsible Institute: GSI, Dublin

Details:

Record of vessel track and fix plot for geological cruise. Equipment used was EG&G boomer, Simrad MS 922 Sidescan Sonar, RoxAnn, and echosounder. Detailed investigation of potentially economic gravel areas on south coast.

(see CD-ROM:/Spreadsheets/gsi cr 2-93 wgs 84.xls)

November 2002  88
Prospec

Cruise: Prospec (Thalassa)
Dates: 27/06/1996–21/07/1996
Chief Scientist: Jean-Claude Brabant
Responsible Institute: IFREMER

Details:
- 28 chalutages de fond entre 900 et 2000 metres avec greement a 2 entremises jusqu'a 1800 metres puis essai autre greement jusqu'a 2000 metres sans flotteur.
- 3 chalutages pelagiques entre 1100 et 1400 metres, chalut a tres grandes mailles (76 sur 70 m), captures insignifiantes.
- 5 mouillages de nasses appates a fermeture automatique et chronometage du temps de capture.
- 2 mouillages du systeme MAEVA d'observation des poissons autour d'un appat.
- Mise au point des sondeurs Micrel grand fond, observations des detections.
- Reglage des chaluts, observations et mesure de leur geometrie.
- Mensurations biologiques des captures, étude des otolithes, determination d'espèces et catalogue photographique.
Westline 1993

Cruise: Arcadian Searcher
Dates: 1993
Chief Scientist: R.W. Hobbs
Responsible Institute: BIRPS
13 Deep seismic profiles
8. BIBLOGRAPHY

The following is a list of references that are relevant to the above study. Although every effort has been made to make this list as inclusive as possible it is likely that some reference may have been overlooked.


November 2002

93


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