THE IRISH SEA PILOT

REPORT ON COLLATION AND MAPPING OF DATA

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Irish Sea Pilot Steering Group

The Irish Sea Pilot Steering Group provided a focus and a steer to the project overall. Listed in alphabetic order they are:

- Associated British Ports/British Ports Association
- Centre for Environment, Fisheries and Aquaculture Science
- Countryside Council for Wales
- Crown Estates
- Department of Agriculture, Fisheries and Forestry, Isle of Man
- Defra
- Duchas, Government of Ireland
- Environment Agency
- Environment and Heritage Service/Department of Environment, Northern Ireland
- Local Government Association
- Marine Conservation Society/Wildlife and Countryside Link
- National Federation of Fishermen's Organisations
- North Western and North Wales Sea Fisheries Committee/Association of Sea Fisheries Committees
- Scottish Executive
- Scottish Fishermen's Federation
- Wales Coastal and Maritime Partnership
- Welsh Assembly Government

Scientific establishments, companies and other organisations who provided data and/or information:

UK

Aberystwyth University, British Marine Aggregate Producers Association, British Geological Survey, CADW, Crown Estate, Centre for Environment, Fisheries and Aquaculture Science, Countryside Council for Wales, Cumbria Sea Fisheries Committee, Cumbria Marine Litter, Department of Agriculture and Rural Development (Northern Ireland), Department of Enterprise Trade and Investment (Northern Ireland), Department of Environment, Food and Rural Affairs, Department of Environment (Northern Ireland), Department of Trade and Industry, Environment Agency, English Nature, Environment and Heritage Services (Northern Ireland), Encams, English Heritage, Environmental Resource Management, UK Offshore Operators' Association, Fleetwood Fish Producers' Organisation, Fisheries Research Services, Irish Sea Study Group, Joint Nature Conservation Committee, Marine Biological Association (Marine Life Information Network), Marine Conservation Society, Ministry of Defence, North Western & North Wales Sea Fisheries Committee, Ordnance Survey, Ordnance Survey Northern Ireland, Proudman Oceanographic Laboratory, Royal Commission on Ancient and Historic Monuments Scotland, Royal Yachting Association, Sea Watch Foundation, Scottish Executive, Scottish Environment Protection Agency, Scottish Fisheries Protection Agency,

Sea Mammal Research Unit, Scottish Natural Heritage, South Wales Sea Fisheries Committee, UK Digital Energy & Atlas Library (DTI/BGS), UK Hydrographic Office, University of Ulster Coleraine, University Marine Biological Station Millport, Welsh Assembly Government.

Isle of Man

Department of Agriculture Fisheries and Forestry, Department of Local Government and the Environment, Department of Transport, Port Erin Marine Laboratory.

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Roger Proctor, Juan Brown: Proudman Oceanographic Laboratory.

List of abbreviations

UK

BMAPA	British Marine Aggregate Producers Association
BGS	British Geological Service
CE	Crown Estates
CEFAS	Centre for Environment, Fisheries and Aquaculture Science
CCW	Countryside Council for Wales
CSFC	Cumbria Sea Fisheries Committee
DARD(NI)	Department of Agriculture and Rural Development (N Ireland)
DEFRA	Department of Environment, Fisheries and Rural Affairs
DETI	Department of Enterprise, Trade and Investment (N Ireland)
DOE(NI)	Department of Environment (N Ireland)
DTI	Department of Trade and Industry
EA	Environment Agency
EN	English Nature
EHS	Environment and Heritage Service (N Ireland)
ERM	Environmental Resource Management Ltd
FFPO	Fleetwood Fish Producers Organisation
FRS	Fisheries Research Services
ISSG	Irish Sea Study Group (UK and Ireland)
JNCC	Joint Nature Conservation Committee
MBA (MarLIN)	Marine Biological Association (Marine Life Information Network)
MCS	Marine Conservation Society
MOD	Ministry of Defence
NWNWSFC	North Western and North Wales Sea Fisheries Committee
OS	Ordnance Survey
OSNI	Ordnance Survey Northern Ireland
POL	Proudman Oceanographic Laboratory
RCAHMS	Royal Commission on Ancient and Historic Monuments in Scotland
RYA	Royal Yachting Association
SAHFOS	Sir Alistair Hardy Foundation for Ocean Sciences
SE	Scottish Executive
SEPA	Scottish Environment Protection Agency
SFPA	Scottish Fisheries Protection Agency
SMRU	Sea Mammal Research Unit
SNH	Scottish Natural Heritage
SWSFC	South Wales Sea Fisheries Committee
UK DEAL	UK Digital Energy and Atlas Library
UKHO	UK Hydrographic Office
UKOOA	UK Offshore Operators Association
UMBS	University Marine Biological Station, Millport
WAG	Welsh Assembly Government

Isle of Man

DAFF	Department of Agriculture, Fisheries and Forestry
DLGE	Department of Local Government and the Environment
DOT	Department of Transport
PEML	Port Erin Marine Laboratory, University of Liverpool

Ireland

DCMNR	Department of Communications, Marine and Natural Resources
DOD	Department of Defence
DELG	Department of Environment and Local Government
DPE	Department of Public Enterprise
EPA	Environmental Protection Agency
ISA	Irish Sailing Association

International

ICES	International Council for the Exploration of the Sea
OSPAR	Oslo-Paris Convention

Executive Summary

This report sets out the aims of the data and mapping element of the Irish Sea Pilot and the experience of acquiring data from partner organisations. It considers some of the key issues arising from this work and develops a series of Irish Sea Pilot recommendations for data collation and mapping. The report includes a catalogue of the spatial data sets acquired.

Data collation & mapping

The Pilot identified and prioritised those data sets that were considered most relevant to testing the marine nature conservation framework. Data on coastal boundaries, geophysical and hydrographical characteristics, protected areas, natural resources and human uses of the Irish Sea were acquired and mapped using a geographic information system (GIS) (see data catalogue, Annex 1). Public, private and non-government organisation (NGO) sector bodies contributed data and some were collated by contractors or used under license. Difficulties were encountered in obtaining habitat, species and human activity data associated with lack of availability, incompatible formats and cost. There was reluctance of both public agencies (because of internal costs) and private sector (commercial value) data holders to release information. Data acquisition was continued beyond the scheduled deadline (31 March 2003) to address some of the difficulties but was concluded at 31 May 2003 in order to move on to other tasks. The information available on habitats, species and human activities was patchy or of poor quality. Complete Irish Sea coverage was not obtained for some data topics. Many of the data sets identified and collated by the Pilot would be needed to inform regional sea planning and management, but the catalogue is not intended to comprehensively scope data requirements for this purpose.

Consultation

A wide consultation on the report was undertaken during August and September 2003. Responses to the consultation have been taken into account in this final report and recommendations.

Conclusions and recommendations

Strategic, ecosystem based and sustainable planning and management of human activities in the marine environment is dependent on access to appropriate and adequate information and data. The Pilot collated geophysical, hydrographical, nature conservation, ecological and sectoral human use data and used GIS analysis. While intertidal and near-coast biological information was found to be satisfactory, data were sparse for most offshore localities to a degree which would constrain good decision-making. Furthermore, some survey data were not available to the Pilot, either because they were held in an inappropriate format or because the data owner declined to release it.

The recommendations from the report of the Pilot on data collation and mapping are:

1. **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.**

2. **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.**
3. **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.**
4. **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.**
5. **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.**
6. **Information on the sources, availability, extent and attributes of datasets (comprehensive metadata) for the marine environment needs to be easily and widely accessible.**

Contents

1. Origins, aims and structure of the Irish Sea Pilot

The UK Government's Review of Marine Nature Conservation (RMNC) interim report (published March 2001) recommended that a trial of regional sea management should be undertaken to inform the development of UK marine nature conservation policy. The Irish Sea was selected as the trial area by the RMNC working group because it is a discrete recognisable regional sea with important nature conservation interests and many potentially interacting human activities. The diverse stakeholder interests of the Irish Sea including 2 EU member states (and other EU states with fishing rights), 4 devolved administrations of the UK, the Crown Dependency of the Isle of Man and representation from all principle marine economic sectors, provided a challenging environment in which to test the potential for achieving consensus on objectives and management measures for the nature conservation interests of the regional sea.

JNCC was commissioned by Defra to undertake the pilot from May 2002 with a reporting deadline of December 2003. Technical GIS and data management resources of JNCC in Peterborough were available to support a dedicated team of 2.5 staff based in English Nature's Kendal office.

The aims of the Pilot are:

i. to test ways of integrating nature conservation into key sectors in order to make an effective contribution to sustainable development at a regional level;

ii. to test the marine nature conservation framework proposed by the UK Country Nature Conservation agencies: *'An implementation framework for the conservation, protection and management of nationally important marine areas'*;

iii. to determine the potential of existing regulatory and other systems for delivering effective marine nature conservation and identify any gaps; and

iv. to recommend measures to fill any of the gaps identified in the areas of regulation, regulatory responsibility and enforcement.

The framework in 1.3ii above proposes protecting nature conservation interests in the marine environment at four scales. The Pilot will propose conservation and management objectives for the Irish Sea at these scales:

i. the regional sea;

ii. the main ecological sub-divisions known as marine landscapes (seabed types or ecological units[1]);

iii. special areas; and

iv. habitats and species including mobile species.

The full specification for the pilot and its work programme can be found on a dedicated website set up to hold the reports, papers and other products at: www.jncc.gov.uk/irishseapilot

[1] The title Marine landscapes was selected by the RMNC working group in June 2003 in place of Ecological units. The use of marine landscapes is described in a paper on the web site with a map of their distribution in the Irish Sea, see: www.jncc.gov.uk/irishseapilot click ecological.

2. Data collation and mapping; boundary, purpose and methods

2.1 Boundary of the Pilot

The geographical area of the Irish Sea used for the Pilot is as shown on Map 1. The boundaries were:

- **Southern boundary:** St. Georges Channel from Linney Head, Wales to Mine Head, Ireland.
- **Northern Boundary:** North Channel from Mull of Kintyre, Scotland to Fair Head, Northern Ireland

The purpose of identifying boundaries was to define the geographical area for data gathering and mapping. The boundaries were defined following a consultation with stakeholders and with the endorsement of the Steering group. They reflect the focus of this project on nature conservation interests, features and designations. The main alternative was to make the boundaries of the project coincide with the more limited fisheries area International Council for the Sea (ICES) VIIa (Map 2). Use of the ICES area would have simplified access to fisheries statistical data. However, the larger study area was considered to reflect better the need to take an ecosystem approach and current understanding of the marine ecosystems within the Irish Sea and adjacent areas. The Pilot area corresponded closely to that identified and adopted by the Irish Sea Study Group and subsequently the Irish Sea Forum. OSPAR recognise the Irish Sea as comprising one part of a larger Celtic Seas area (Map 3). It is recognised that cross-boundary ecological processes, species movements and human activities exist.

Subsequently, it was suggested that, on ecological criteria, the southern boundary of the area might be more appropriately be re-drawn to Carnsore Point, in Ireland. For the purposes of the Pilot this suggestion was not adopted. For future regional sea work, this could be considered further.

2.2 Purpose

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:

- 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;
- 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
- 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 spatially relating datasets to one another.

The most important uses of Irish Sea data were expected to be:

- to enable the identification and biological characterisation of marine landscapes;
- to apply the draft UK criteria for the identification of nationally-important habitats and species;
- to identify areas in the Irish Sea with high biodiversity or which are otherwise particularly important for nature conservation;
- to explore relationships between the distribution of important nature conservation features and the nature and intensity of human use of the Irish Sea; and
- to help disseminate the outcomes of the Pilot through map-based products.

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.

2.3 Method

Preliminary work was undertaken to identify the occurrence, ownership, availability and format of relevant datasets, and to identify priority datasets from those potentially available. Two short preliminary studies by consultants identified the available physical, hydrographical and biological data most relevant to the Pilot's aims and determined ownership and format. The Centre for Environment, Fisheries and Aquaculture Science (CEFAS) prepared a catalogue of their own data holdings and Dipper prepared a catalogue of non-CEFAS data holdings. The unedited catalogues are held by JNCC. For biological data, effort was focused on biota found below low water mark to avoid overlap with coastal nature conservation mechanisms.

Factors which guided the acquisition of physical, hydrographical and biological data were:

- the probable utility of the data for the purposes outlined above;
- 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;
- the format, cost and ownership of the data, and the degree of difficulty of conversion required; and
- 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.

Similar factors were used to prioritise data on natural resources and human uses of the Irish Sea together with two other factors, namely:

- the probable importance of a particular human activity in relation to conservation interests; and
- 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.

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 and others compiled under contract.

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, ArcGIS8 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.

3. Data collation and mapping; data sets

Annex 1 lists the datasets which the Pilot sought to acquire, with a brief description of their scope, the area covered, the source organisation, the priority weighting given by the Pilot, the work required to convert the data, and the experience of the Pilot with acquisition and presentation.

3.1 Baseline maps

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 OS uses mean high water for its coastline, but this differs from the UKHO and 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 OS and the Marine Institute of Ireland. The OS GB 1:10,000 scale coastline data were used but created an unmanageably large file size, which was reduced by generalising (removing) some intermediate data points.

3.2 Hydrographic data

Hydrographical data (including data on water temperature, salinity, currents and frontal systems) were provided at no cost by the Proudman Oceanography Laboratory (POL), the British Oceanographic Data Centre and the Plymouth Marine Laboratory. These hydrographical data were used in the definition of certain seabed marine landscapes and also in the definition of water column types (Golding *et al* 2004). The data used were modelled data and required considerable manipulation. POL supplied data based on research models covering 90% of the Pilot study area which required conversion and interpolation to create GIS format files for analysis with other GIS layers.

3.3 Geophysical data

Bathymetry (DigBath250) and seabed (DigSBS250) data were obtained under licence from the British Geological Survey (BGS) in the format of ArcGIS8 shapefiles. These data, combined with bed form and slope data, were of great utility in the definition and mapping of marine landscapes (Golding *et al* 2004). The seabed sediment data were supplied in 20 classes, geo-referenced and in GIS format. These datasets were derived from data compiled for the 1:250,000 offshore geological maps and are thus regional in nature but considered adequate for the Pilot.

A limitation of BGS data is that both the bathymetry and seabed sediment datasets do not include shallow coastal waters and estuaries.

3.4 Biological data

Data on vertebrates were obtained from a number of sources, including CEFAS (commercial fish), JNCC (seabirds), JNCC, Sea Mammal Research Unit and Sea Watch 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.

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), Countryside Council for Wales, universities and research institutions. Sea-Scope were contracted to collate additional habitat and species information (Annex 2). The Marine Biological Association were contracted to undertake an information search on selected habitats and species (Parr & Ager 2003); downloadable reports are available from the *MarLIN* website at www.marlin.ac.uk/newsletters_reports/Reports.htm). Species information was added to the Marine Recorder database for inclusion in MarLIN and habitat data were 'tagged' with biotope complex codes from the MNCR Marine Habitat Classification for Britain and Ireland. The Irish BioMar data were made available. While high density data are available for coastal and inshore locations, the data for offshore areas were much more sparse (Lieberknecht *et al* 2004b). 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.

For Wales, CCW had prepared an atlas of Biodiversity Action Plan (BAP) Species & Habitats included the features on UK BAP, UK Species of Conservation Concern (SOCC), and 'Habitats and Species Principle Importants' lists for Wales. For each feature, a description, habitat preferences, biotopes, rarity, legislation, data and image sources, statutory sites, gaps in knowledge, threats and sources of further information were provided. Unfortunately these data were only available for this part of the Irish Sea.

3.5 Human activity data

The pilot recognised 14 main human use categories as identified by OSPAR and shown in Table 1.

Table 1: OSPAR human use categories & key data for the Pilot to acquire

	Human use category	Principle datasets
1.	Conservation	Protected areas, archaeology
2.	Fisheries	Fisheries sensitivity; spawning & nursery areas. Distribution & intensity of fishing. Closed areas.
3.	Mariculture	Mariculture sites by type & production levels.
4.	Coastal defence & engineering	Coast protection & defence structures.
5.	Shipping & navigation	Shipping routes, intensity of use by vessel type & size. Ports, harbours and marinas.
6.	Dredge & spoil disposal	Capital & maintenance dredging areas. Dredging licenses, disposal sites.
7.	Oil and gas	Distribution of oil and gas exploration & production.
8.	Renewable energy. Wave, tide & wind	Areas of search, proposed & approved sites for offshore windfarms. Areas of interest for other renewables.

	power generation	
9.	Sand and gravel extraction	Aggregate dredging areas.
10.	Coastal land use	Coastal settlements, populations, industry & development. FEPA consents.
11.	Tourism and recreation	Bathing waters and other important areas for recreation.
12.	Inputs of contaminants	Discharges. Water quality issues and tends. Former sewage sludge disposal sites.
13.	Submarine cables	Maps of submarine cables.
14.	Military activities	Military practice & exercise areas. Munitions dumps.

Previous reviews of human use of the Irish Sea include the Irish Sea Study Group and Irish Sea Forum reports, JNCC Coastal Directories and the OSPAR Celtic Sea Quality Status 2000 Report. These reports provide valuable information on the likely significance and relative importance of the various human uses on the Irish Sea ecosystem and nature conservation interests. Together with advice from scientists and sector stakeholders, they have been used to help identify the spatial datasets which are available and prioritise those of greatest value to the Pilot.

Conservation: 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. Archaeology includes the location and details of wrecks protected under the UK Protection of Wrecks Act. In Ireland, all wrecks older than 100 years are afforded protection; several thousand are known within the Irish Sea study area but data was not yet available. The location and details of Scheduled Ancient Monuments adjacent to or below high water were mapped for the whole Irish Sea using UK and Ireland data. There are more extensive listings, tens of thousands, for non-scheduled sites and areas of archaeological interest ranging from sites of individual artefact finds to extensive marine exposures of peat. This level of detail is not required for the Pilot but may be relevant for future more local marine spatial planning initiatives

Fishing: Overall, fishing has one of the most significant impacts on marine ecosystems and a high priority was given to collation and mapping of relevant spatial datasets. Data on the distribution and relative intensity of fishing effort were obtained from Defra and the Scottish Fisheries Protection Agency (SFPA). These data were derived from aerial surveillance and have limitations. For example, surveillance flights are only in daytime hours, the surveillance concentrates on offshore fishing and the fishing intensity is mapped at a relatively coarse scale. The data obtained covers the period 1996-2002; earlier SFPA data are not compatible. The date and location of each vessel observed fishing, the fishing gear used and the vessel's nationality is recorded. Data on the frequency of over-flights to each ICES sub-square (0.5^o latitude by 1^o longitude, which at UK latitudes measures approximately 30 x 30 nautical miles) enabled the number of observations made during each over-flight, the relative intensity, to be calculated and plotted on a 0.1^o latitude by 0.2^o longitude grid (each grid cell measuring approximately 6 x 6 nautical miles) for the Irish Sea. CEFAS assisted in the analysis of the data. Department of Defense/Defense Services Ireland have limited aerial surveillance data for the Irish Sea but hold satellite surveillance data for larger vessels. CEFAS also mapped the distribution of the main Irish Sea fishing grounds, using information obtained from Government departments, sea fisheries

committees and fishermen, to complement the surveillance data and achieve a more comprehensive view of fishing activities. Data from a satellite-tracked study into the *Nephrops* fishery in the Clyde (Marrs *et al* 2000) illustrates the spatial complexity of fishing activity.

Conservation measures for fisheries include the temporary or permanent closure of areas to specified fisheries or fishing techniques. No central register exists and the location and nature of closed areas was obtained from various sources in various formats and CEFAS assisted with the mapping.

Mariculture: Information on sites licensed for mariculture purposes was obtained from a range of Governmental sources and mapped by type and species.

Coastal defence and engineering: 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. The maps show the presence of linear and other coast protection and flood defence structures. Data for Scotland were provided in the form of paper maps. It did not prove possible to obtain similar data for Wales or Ireland. The Department of Communications, Marine and Natural Resources (DCMNR) did not have a register of coast protection structures in Ireland. For the coast of England and Wales, a greater detail of coast protection and flood defence structures and preferred defence options is available through Shoreline Management Plans and, where necessary, Coast Defence Strategies; this level of detail is not required for purposes of the Pilot however.

Shipping and navigation: Spatial data on ports, shipping routes and shipping intensities for the Irish Sea were purchased from Anatec UK Ltd in GIS format. The full report describing the methods used and data provided is included at Annex 4. Shipping intensity was calculated on a 2 x 2 nautical mile grid.

Dredge and spoil disposal: The locations of spoil disposal sites were provided by Defra/CEFAS for the UK, and by DCMNR for Ireland. Food and Environment Protection Act (FEPA) consent locations for capital and maintenance dredging operations in England and Wales were obtained from Defra and licence locations for capital and maintenance dredging operations were provided for Ireland.

Oil and gas: 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 (DTI) 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.

Renewable energy: The location of proposed and approved offshore wind-farms in the Irish Sea were obtained from the Crown Estate, DTI, Department of Enterprise, Trade and Investment/Department of Public Enterprise and DCMNR. The area of Liverpool Bay/Eastern Irish Sea proposed by DTI for Tranche 2 applications for offshore wind-farms, was also mapped. The locations of potential tidal barrage schemes were obtained from work carried out by the Irish Sea Study Group.

Sand and gravel extraction: 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. Information

was provided on one licence application pending. No licences for aggregate extraction are extant in the Irish sector, pending review of their licensing arrangements; some limited aggregate extraction e.g. from Codling Bank, has occurred previously for coast protection works.

Coastal land use: 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 FEPA consents were obtained from a variety of sources. Settlement locations and sizes and population data were obtained from The DataStore & Bartholomew Ltd, with additional data collated through a contract with BMT Cordah. Major existing and proposed coastal developments with linkages to the sea e.g. port development, power stations discharging heated effluents were also obtained by BMT Cordah. Details of development consents issued under FEPA for England and Wales was provided by Defra and similar data for Northern Ireland by Environment and Heritage Service. It was not possible to achieve wider coverage of the Irish Sea at this level of detail but the data serves to demonstrate the high level of activity in coastal areas.

Data on the extent of significant urban development on the coastline was obtained from the electronic Admiralty charts for the Irish Sea, licensed from the UK Hydrographic Office, although this is at different scales. For Great Britain, a higher quality Ordnance Survey (OS) 1:25,000 vector dataset is held by JNCC, with equivalent data for Northern Ireland, and for Ireland obtainable through OS Northern Ireland and OS Ireland respectively. For the purposes of the Pilot it was not considered a priority to obtain the latter.

Tourism and recreation: 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, Encams and An Taisce.

Inputs of contaminants: 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. The dumping of industrial and sewage sludge at sea has been discontinued, but the location of former sludge dumping grounds in the Irish Sea was mapped. Data on tributyltin contamination, from anti-fouling paints, around the Irish Sea were obtained from Fisheries Research Services (FRS). Concerns over inputs, concentrations and impacts of many contaminants, including pesticides and pharmaceuticals are reviewed in the OSPAR Celtic Sea Quality Status Report 2000, but there are few spatial datasets available at regional sea scale.

Submarine cables: Information on submarine cables was obtained on licence from Global Charting Services in GIS format. The location of the in-service cables is particularly important in marine spatial planning.

Military activities: 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 HO. The dataset includes military vessel exercise areas and firing and bombing ranges. FRS provided data on the Beaufort's Dyke munitions dump.

3.6 General comments on spatial datasets

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.

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.

ArcGIS8 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. ArcGIS8 was found to integrate well with Microsoft Access databases, and, through Access, with Microsoft Excel spreadsheets. Transfer of files between GIS software, specifically from MapInfo, to ArcGIS8 was found to be straightforward.

3.7 Use of spatial datasets by the Pilot

Some of the spatial datasets proved to be essential for the Pilot. These datasets are identified in Annex 1 by heavy shading. These fell into distinct types:

- **Hydrographic and geophysical data sets:** These were critical to the marine landscape classification and mapping element of the Pilot (Golding *et al* 2004).
- **Biological datasets:** The Pilot used all the data on benthic communities that it could access and which was in, could be converted to within the timescales, biotope or biotope complex format. This was critical to the marine landscape characterisation work (Golding *et al* 2004) and work on nationally important features (Lieberknecht *et al* 2004a,b). It would also be critical to the setting of conservation objectives (Lumb *et al* 2004).
- **Human use datasets:** The Pilot used a high proportion of the human use datasets to gain a better understanding of the distribution and relative intensity of human activities, particularly in relation to marine landscapes or biotopes. However, spatial analysis of these relationships using the GIS was restricted to fishing intensity data. Fishing intensity data and marine protected area information was also used with the Marxan computer programme, to explore the possible use of the programme to help develop a marine protected area network in the Irish Sea (Lieberknecht *et al* 2004b). Lack of time precluded more detailed use of these data sets by the Pilot.

For roll-out of the Pilot in the Irish Sea or other Regional Sea, greater use of the other biological and human use datasets would need to be made. The light-shaded datasets in Annex 1 are those that would be of particular importance for future work in the Irish Sea. These include most of the human use datasets.

A few of the datasets in Annex 1 are not shaded. These include datasets that may be of more relevance to monitoring of the condition of the marine environment, for example the data on tributyltin contamination. They also include datasets such as wastewater discharges and nutrient inputs where further expert advice is needed to ensure that the significance to marine spatial planning of these pressures on the marine environment is captured in the most appropriate form.

Annex 1 is not comprehensive and there are likely to be many other datasets relevant to spatial planning and management. For roll-out to other Regional Seas, there are other geographically-specific data sets which would need to be accessed.

3.8 Socio-economic data

The Pilot commissioned Posford Haskoning Ltd to collate statistics on the contribution to the regional economy of the principal sectors which are directly dependent on the Irish Sea. This was not a straightforward piece of work as statistics are compiled for different reasons and are rarely available on an Irish Sea basis. Consequently, amalgamation and estimation had to take place. The contractors were able to utilise the methodology and some of the information provided in the major study undertaken by Pugh and Skinner (2002). The results of the work undertaken by Posford Haskoning Ltd (Lindsay and Stocks, 2003) are included as Annex 3 in this report and are summarised in the Irish Sea Pilot Final Report. Additional information was obtained directly by the Project Team, for example employment in the oil and gas industry, defence expenditure, and some shipping and passenger statistics.

4. Conclusions

4.1 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.

The Pilot experience confirms the findings of IACMST and others that UK data management requires improvement to achieve greater access, efficiency, transparency, accuracy, and cost savings There appears to be widespread duplication of effort in collating data. Contacts with data providers, consultants and other initiatives show that there is a common need for much of the data acquired.

4.2 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.

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.

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.

In contrast, initiatives such as UK DEAL and the National Biodiversity Network (NBN) 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.

Important fisheries data obtained from the industry and agencies required conversion which was undertaken by CEFAS providing valuable assistance to the pilot. CEFAS also updated spawning and nursery area maps for the Irish Sea, and is continuing this work for other UK waters which should ensure that this data is more readily available in future.

4.3 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. This reflects common experience highlighted by data managers and users at information management workshops (e.g. Delivering Integrated Management for the UK (DIMUK), September 2002[2]).

The Pilot confirmed the findings of the IACMST Marine Environmental Data Action Group (MEDAG) 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.

[2] Franklin, F.L. 2002, Delivering Integrated Mapping for the UK (DIMUK) Report of workshop September 2002, CEFAS. Available from www.cefas.co.uk/coastmap

5. Recommendations

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

i. **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.**

ii. **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.**

iii. **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.**

iv. **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.**

v. **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.**

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

6. References

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Golding, N, Vincent, M A and Connor, D W (2004) *The Irish Sea Pilot: Report on the development of a Marine Landscape classification for the Irish Sea.* Joint Nature Conservation Committee, Peterborough. Available online at www.jncc.gov.uk/irishseapilot.

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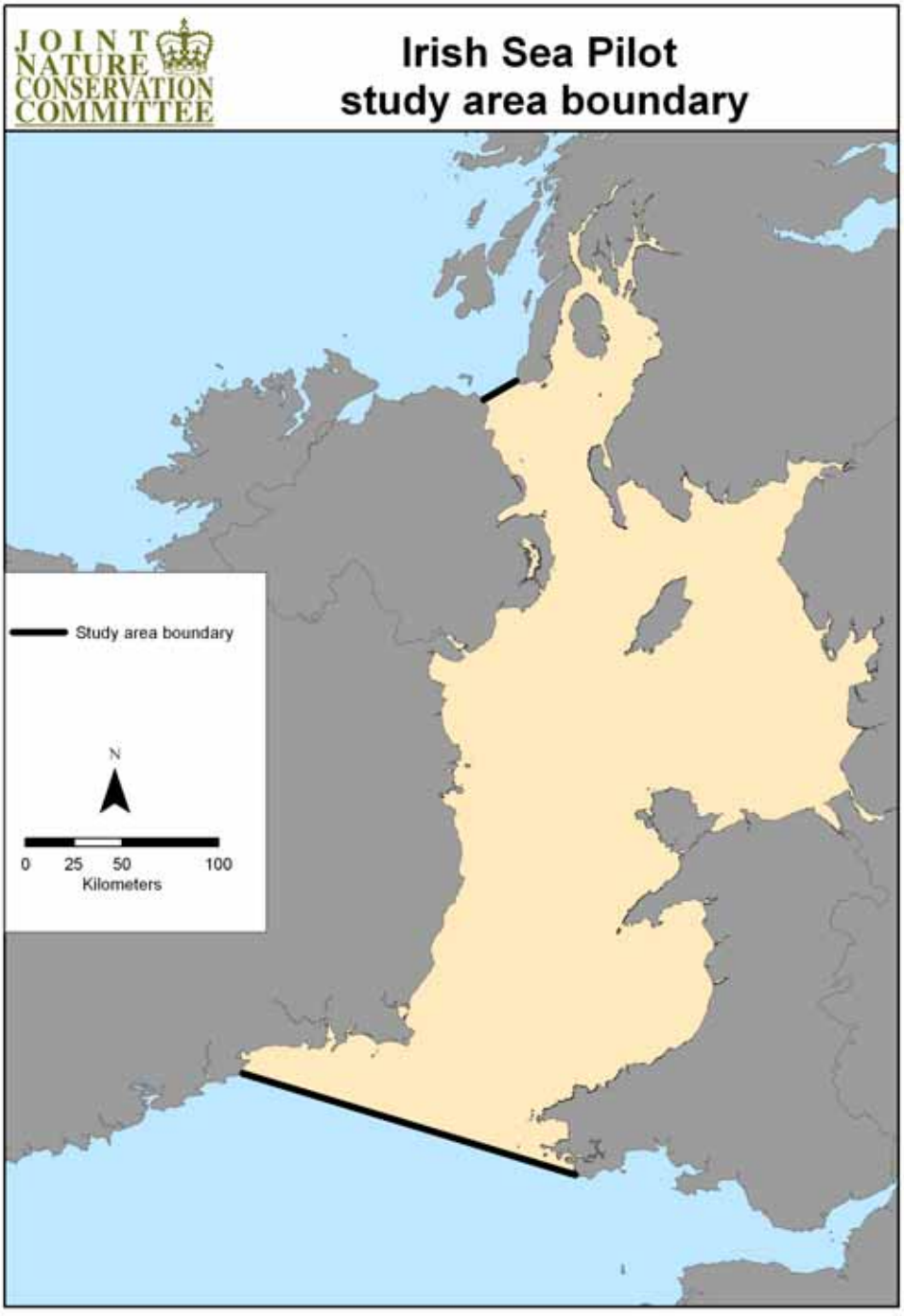
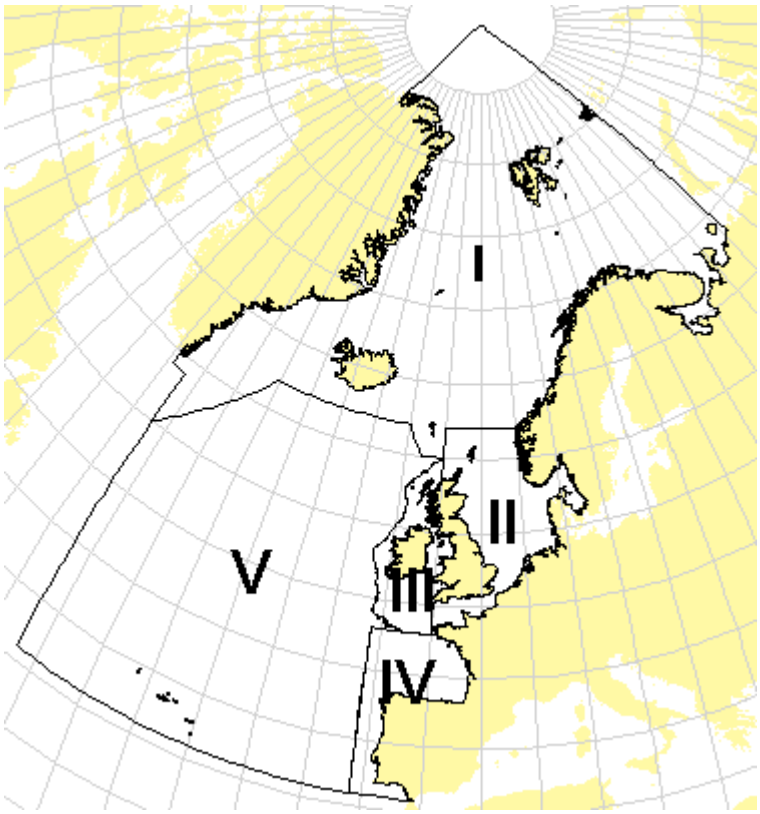
Weighell, A J, Donnelly, A P and Calder, K (2000) *Directory of the Celtic Coasts and Seas.* Joint Nature Conservation Committee, Peterborough.

Map 1: Irish Sea Pilot project boundary



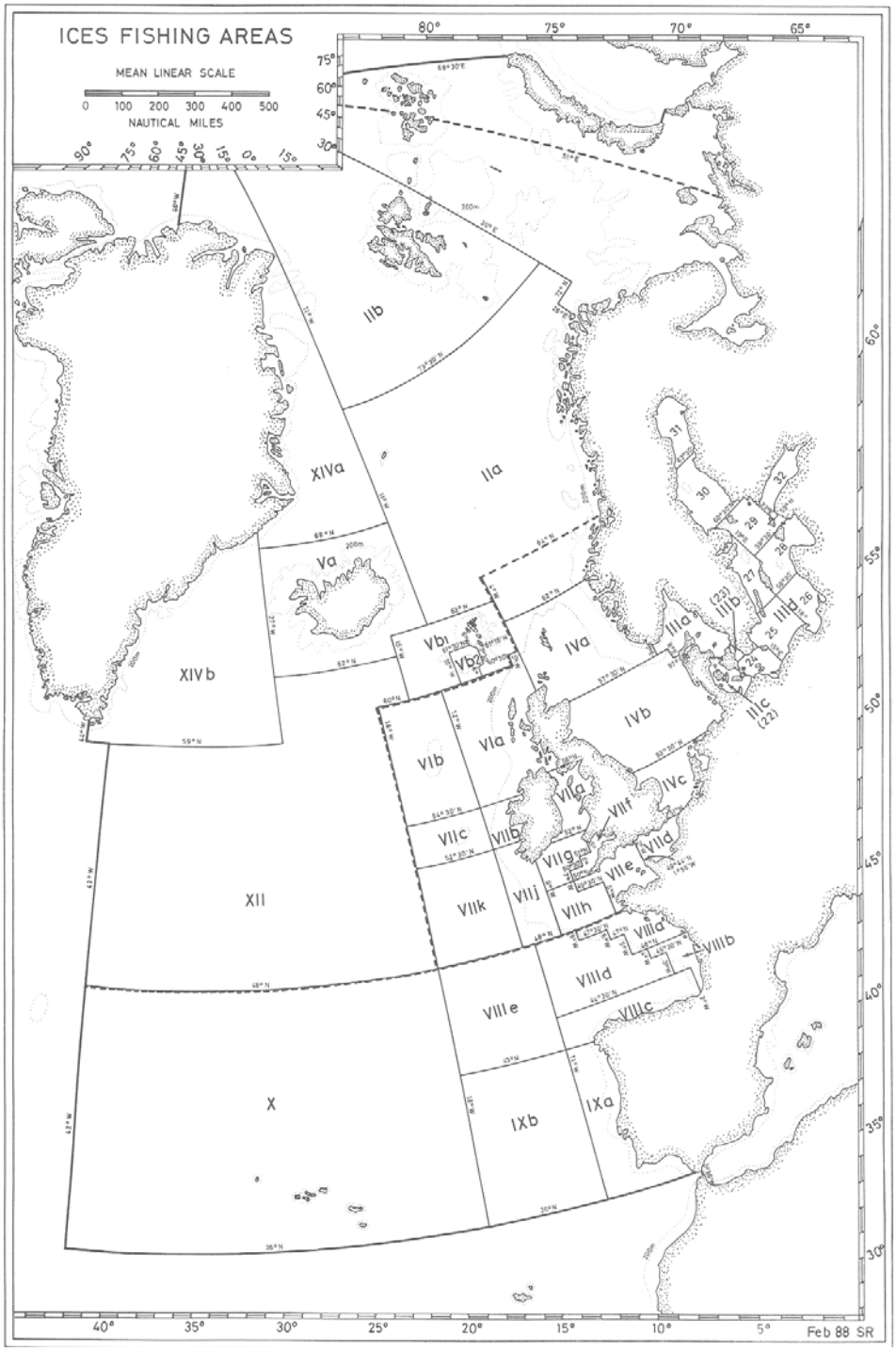
Map 2: OSPAR 'Regional seas' showing the five regions used for reporting by the Quality Status Report 2000

The Irish Sea Pilot study area forms part of the OSPAR Region III: Celtic Seas.



Map acknowledgement and copyright OSPAR.

Map 3: ICES fishing areas around the UK showing the ICES VIIa Irish Sea area



Map acknowledgement and copyright ICES.

Annex 1 Data catalogue Part 1: General, geophysical, hydrological, ecological, conservation data

Title	Description	Area covered	Source organisation	Priority[3]	Conversion required & comments	Data received	Data converted	Map completed
Boundary data								
Common coastline	Combined dataset from OS, OSNI and Marine Institute for Ireland and Isle of Man	UK	OS, OSNI Marine Institute	1	Considerable	Y	Y	Y
Offshore limits	3, 6 and 12 mile offshore limits for UK and Ireland	UK	CEFAS Marine Institute	2	Already in GIS format	Y	Y	Y
Geophysical data								
Bathymetry	Depth contours	All Irish Sea	BGS	1	Converted to polygons	Y	Y	Y
Sediment types	By grain size and classified using Folk	All Irish Sea	BGS	1	Classes combined	Y	Y	Y
Sea bed slope	Shows sea bed profile	All Irish Sea		1	Created by JNCC from bathymetry	Y	Y	Y
Gas seeps layer	Distribution of gas seeps	All Irish Sea	BGS	1	Clipped to Irish Sea	Y	Y	Y
UK Inlets	UK Physiographic classification of inlets. Ireland via WFD types	Irish Sea coast	JNCC	1	Already in GIS format	Y	Y	Y
Hydrographical data								
Temperature	Bottom temperature for 3 monthly periods per annum	Restricted to Model (90% of study area)	POL	2	Interpolation and conversion to polygons	Y	Y	Y
Salinity	Bottom salinity for 3 monthly periods per annum	Restricted to Model (90% of study area)	POL	2	Interpolated & conversion to polygons	Y	Y	Y
Photic zone	Circalittoral rock records from MNCR database used as surrogate to map photic zone	Irish Sea coast	MNCR	2		Y	Y	Y
Frontal systems	Location of fronts in Irish Sea	Irish Sea	POL	1	Data requested from POL	Y	Y	Y
Sea bed shear stress	Seabed shear stress	Restricted to Model (90% of study area)	POL	2	Data requested from POL	Y	Y	Y
Sea bed currents	Seabed current velocity	Restricted to Model (90% of study area)	POL	2	Data requested from POL	Y	Y	Y

[3] Priority accorded to collation for the Irish Sea Pilot project

Title	Description	Area covered	Source organisation	Priority	Conversion required & Comments	Data received	Data converted	Map completed
Ecological data								
Sea birds	Sea birds at Sea records (62 species)	Intermittent recording of species in grid	JNCC	1	No	Y	Y	Y
Cetaceans, fish and turtles	Cetaceans, seals, large fish, turtles (40 species)	Intermittent recording of species in grid	JNCC	1	No	Y	Y	Y
Sea bird colonies	Areas of coastal colonies	Irish Sea	JNCC	1	No	Y	Y	Y
Cetaceans distribution	Records from many surveys	Irish Sea	SMRU SeaWatch	1	No	Y	Y	Y
Biomor I	Quantitative and qualitative benthic sampling data using grabs, with station selection following a semi-stratified strategy. Data on both benthos and sediment types.	NW Anglesey 53 25N to St.David's Head, Pembs 51 50'N. Four main sub-areas: St. George's Channel, Celtic Deep, Cardigan Bay, Caernarfon Bay.	National Museums & Galleries of Wales	2	Biotope tagged. Import into ArcMap	Y	Y	Y
Biomor 2 data release pending	Quantitative and qualitative benthos and sediment grab sample data, stations selected on semi-stratified strategy.	same as BioMor I: Positions only, not released yet.	NMGW & University of Dublin	n/a	Positions imported into ArcMap	n/a	n/a	n/a
Irish Sea Seabed Image Archive (ISSIA)	A directory of seabed camera studies in the Irish Sea.	Irish Sea	University of Wales, Bangor	2	Biotope tagged. Imported into ArcMap	Y	Y	Y
MNCR	MNCR Database and Ireland BioMar data.	UK	JNCC	1	Biotope Tagged: imported into ArcMap	Y	Y	Y
UKOAA	UK offshore oil and gas environmental surveys.	Irish Sea Blocks	ERT/ UKOOA	2	Being entered into Marine Recorder. Biotope tagging pending	Part	N	N
BAP Species	Atlas of BAP Species & Habitats	Wales	CCW	2	Imported into ArcMap	Y	Y	Y
CCW/ Sea-scope Sites data collation I	Contract with Sea-Scope to collate Welsh data not held by CCW	Wales	CCW	2	Imported into ArcMap	Y	Y	Y
CCW/ University of Wales sites data collation II	Ivor Rees and student trawl and grab benthic fauna and sediments data.	Wales, mainly Red Wharf Bay and Conwy Bay	CCW	2	Imported into ArcMap	Y	Y	Y

Title	Description	Area covered	Source organisation	Priority	Conversion required & comments	Data received	Data converted	Map completed
1998 Annual CEFAS 4m beam trawl survey	Catch per unit effort for benthos.	Irish Sea	CEFAS via MarLIN	1	Biotope tagging pending:	Y	Y	N
1998-01 scallop dredging	Isle of Man long-term effects of dredging: re-analysis of historical data	Isle of Man	MarLIN	2	Biotope tagging pending:	Y	Y	N
1997-01 DARD (Northern Ireland) Surveys		Irish Sea	MarLIN	2	Biotope tagging pending:	Y	Y	N
1989 Ironotter	Point Benthos Survey	Greenock, Clyde Sea	MarLIN	2	Biotope tagging pending:	Y	Y	N
1992 Ironotter	Point Benthos Survey	Greenock, Clyde Sea	MarLIN	2	Biotope tagging pending:	Y	Y	N
1995 Ironotter	Point Benthos Survey	Greenock, Clyde Sea	MarLIN	2	Biotope tagging pending:	Y	Y	N
1998 Ironotter	Point Benthos Survey	Greenock, Clyde Sea	MarLIN	2	Biotope tagging pending:	Y	Y	N
Underwater species survey		Wales	MarLIN	2	Biotope tagging pending:	Y	Y	N
Plankton data	Analysis of plankton data for marine landscape classification	Irish Sea	SAHFOS	1	Spatial joining to marine landscape dataset	Y	Y	Y
Conservation data								
Protected sites	SACs, SPAs, SSSIs (ASSIs), MNR, NNR, LNR, Ramsar, MEHRA	Irish Sea	JNCC and Country Agencies	1	Imported from other GIS. Conservation objectives will be added	Y	Y	Y

Annex 1 Data catalogue Part 2: Human use data

Title	Description	Area covered	Source organisation	Priority	Conversion required and comments	Data received	Data converted	Map completed
Fisheries								
Fish spawning areas	Spawning areas of key commercial fish/shellfish species (cod, herring, whiting, plaice, sole, *Nephrops*)	Whole Irish Sea	CEFAS	1	Provided in GIS format	Y	Y	Y
Fish nursery areas	Nursery areas of key commercial fish species (bass, cod, herring, whiting, plaice, sole)	Whole Irish Sea	CEFAS	1	Provided in GIS format	Y	Y	Y
Key fishing grounds	Map of fishing grounds of key fish/shellfish including seasonality; eg cod, whiting, plaice, sole, haddock, whiting, herring, scallop and *Nephrops*	Eastern Irish Sea	Tom Watson Fleetwood FF/FPO	1	Digitised and collated into single map by CEFAS	Y	Y	Y
Key fishing grounds	Map of inshore fishing grounds on the Welsh coast	E&N Wales coast	NW & NW SFC	1	Digitised and collated into single map by CEFAS	Y	Y	Y
Key fishing grounds	Map of inshore fishing grounds on the Welsh coast	S Wales coast	SWSFC	1	Digitised and collated into single map by CEFAS	Y	Y	Y
Key fishing grounds	Map of inshore fishing grounds on the Welsh coast	Wales coast	Thomas: Aberystwyth University	1	Digitised and collated into single map by CEFAS	Y	Y	Y
Key fishing grounds	Map of inshore fishing grounds on the Cumbria coast	Cumbria coast	CSFC	1	Project Team to digitise	Y	N	N
Key fishing grounds	Map of fishing grounds and fishing intensity for *Nephrops* in the Clyde	Clyde Sea area	UMBS	1	Digitised and collated into single map by CEFAS	Y	Y	Y
Key fishing grounds	Map of fishing grounds around IOM	Isle of Man	DAFF/ IOMFA/SA	1	Digitised and collated into single map by CEFAS	Y	Y	Y
Key fishing grounds	Map of fishing grounds in western Irish Sea (N Ireland)	Northern Ireland	DARDNI Fisheries	1	Digitised and collated into single map by CEFAS	Y	Y	Y
Key fishing grounds	Map of fishing grounds in western Irish Sea (Ireland)	Ireland	DCMNR Sea Fisheries	1	DCMNR to provide maps	N	N	N

Title	Description	Area covered	Source organisation	Priority	Conversion required and comments	Data received	Data converted	Map completed
Relative fishing intensity	The distribution and relative intensity of fishing activity as determined from aerial surveillance data over the period 1996 -2002. Shows distribution by gear type (beam trawl, trawl, dredge, potter/whelker), by quarter and for whole period and by nationality.	Whole Irish Sea except Scotland and Ireland 12 mile zones	Defra	1	Data plotted as a grid. Relative intensity calculated from the number of overflights.	Y	Y	Y
Relative fishing intensity	The distribution and relative intensity of fishing activity as determined from aerial surveillance data over the period 1996 -2002. Shows distribution by gear type (*Nephrops* trawl, trawl, potter), by quarter and for whole period and by nationality.	Scotland	Scottish Fishery Protection Agency	1	Data plotted as a grid. Relative intensity to be calculated from the number of overflights.	Y	Y	Y
Relative fishing intensity	The distribution and relative intensity of fishing activity as determined from aerial/satellite surveillance data	Ireland	Department of Defense/ DCMNR Sea Fisheries	1	Data requested	N	N	N
Fishing ports	Major fishing ports in the Irish Sea	Whole Irish Sea	Anatec UK Ltd	1	Selected and mapped from the Anatec UK Ltd ports dataset	Y	Y	Y
Access of member states to Irish Sea	Access of other member states in the 6-12 mile zone	Whole Irish Sea	EC	1	Digitise and import into ArcGIS8	Y	N	N
Fishery closed areas	Irish Sea Cod recovery plan - maps of temporary closure areas and measures applying.	Irish Sea	DARDNI	1	Digitised and imported into ArcGIS8 (CEFAS)	Y	Y	Y
Fishery closed areas	IOM scallop no-fishing area.	IOM	DAFF	1	Digitised from coordinates and imported into ArcGIS8 (CEFAS)	Y	Y	Y
Fishery closed areas	Scallops (Irish Sea)(Prohibition of Fishing) Order 1984	UK	UK Government	1	Digitised from coordinates and imported into ArcGIS8 (CEFAS)	Y	Y	Y

Title	Description	Area covered	Source organisation	Priority	Conversion required and comments	Data received	Data converted	Map completed
Fishery closed areas	Details of fishery closed areas	SWSFC District	SWSFC	1	Digitised from coordinates and imported into ArcGIS8 (CEFAS)	Y	Y	Y
Fishery closed areas	Details of fishery closed areas	NW&NWSFC District	NW& NWSFC	1	Provided in GIS format	Y	Y	Y
Fishery closed areas	Bass nursery areas	UK	Defra	1	Digitised from coordinates and imported into ArcGIS8 (CEFAS)	Y	Y	Y
Fishery closed areas	Herring spawning grounds; juvenile herring nursery grounds; herring spawning grounds (Manx stock)	Irish Sea	Defra Sea Fisheries Inspectorate	1	Provided in GIS format	Y	Y	Y
Fishery closed areas	Details of fishery closed areas	N Ireland	DARD Sea Fisheries	1	Digitised from map and imported into ArcGIS8 (CEFAS)	Y	Y	Y
Fishery closed areas	Details of fishery closed areas	Ireland	DCMNR Sea Fisheries	1	Data requested	Y	Y	Y
Mariculture								
Mariculture sites	Details of sites licenced for mariculture by type and species	England & Wales	CEFAS	1	Import into ArcGIS8	Y	Y	Y
Mariculture sites	Details of sites licenced for mariculture by type and species	Scotland	FRS	1	Data being extracted for ISP	Y	Y	Y
Mariculture sites	Details of sites licenced for mariculture by type and species	N Ireland	DARDNI	1	Data being extracted for ISP	Y	Y	Y
Mariculture sites	Details of sites licenced for mariculture by type and species	IOM	DAFF/PEML	1	Provided in GIS format	Y	Y	Y
Mariculture sites	Details of licenced and application areas for mariculture by general type, extensive/intensive and species cultivated	Ireland	DCMNR	1	Clipped Irish Sea data and mapped by licenced and proposed	Y	Y	Y
Shellfish Several Orders	Details of Several Orders (covers all Several Orders on England & Wales ISP coast)		NWNWSFC	1	Provided in GIS format	Y	Y	Y
Seed mussel harvesting areas	Details of areas used for harvesting/bottom-dredging seed mussel for re-laying for mariculture	NWNWSFC District	NWNWSFC	2	Provided in GIS format	Y	Y	Y

Title	Description	Area covered	Source organisation	Priority	Conversion required and comments	Data received	Data converted	Map completed
Seed mussel harvesting areas	Details of areas used for harvesting/bottom-dredging seed mussel for re-laying for mariculture	CSFC District	CSFC	2	Data requested; digitise and import into ArcGIS8	Y	N	N
Seed mussel harvesting areas	Details of areas used for harvesting/bottom-dredging seed mussel for re-laying for mariculture	Scotland	SFPA/FRS	2	Data requested	N	N	N
Seed mussel harvesting areas	Details of areas used for harvesting/bottom-dredging seed mussel for re-laying for mariculture	N Ireland	DARDNI	2	Data being collated	N	N	N
Seed mussel harvesting areas	Details of areas used for harvesting/bottom-dredging seed mussel for re-laying for mariculture	Ireland	Marine Institute	2	Data requested	N	N	N
Shipping								
Shipping data	Shipping routes and volumes by 4 vessel types (merchant shipping; tankers; ferries; offshore vessels) and by 4 size categories.	Irish Sea	Anatec UK Ltd	1	Provided in GIS format	Y	Y	Y
Key ports	Locations of major ports together with details of some port jurisdictions	Irish Sea	Anatec UK Ltd	1	Provided in GIS format	Y	Y	Y
MEHRAs	Locations of possible/proposed MEHRAs	Irish Sea	DfT	2	JNCC MIT hold draft maps.	Y	Y	N
Dredge & disposal								
Dredge disposal sites	Details of dredge disposal sites, disposal licences and amounts	UK	DEFRA	1	Convert data and import to ArcGIS8	Y	N	N
Capital & maintenance dredging	Details of capital and maintenance dredging licences, areas and amounts	UK	DEFRA	1	Convert data and import to ArcGIS8	Y	Y	Y
Capital & maintenance dredging	Details of licenced dredging areas	IOM	DOT	1	Provided in GIS format	Y	Y	Y
Dredge and disposal sites	Details of dredging and dredge disposal sites and amounts	Ireland	DCMNR	1	Data being collated for ISP	Y	Y	Y
Oil and gas								
Oil and gas reserves	Details of oil and gas fields in the Irish Sea	UK	DTI Oil & Gas/UK DEAL	1	Supplied in GIS format	Y	Y	Y
Oil and gas licence areas	UK 20th Offshore Licensing Round.	UK	DTI/UK DEAL	1	Provided in GIS format; clipped to study area	Y	Y	Y

Title	Description	Area covered	Source organisation	Priority	Conversion required and comments	Data received	Data converted	Map completed
Oil and gas licence areas	Details of UK CS offshore areas under licence.	UK	DTI/UK DEAL	1	Provided in GIS format; clipped to study area	Y	Y	Y
Oil and gas seabed wells	Details of seabed wells	UK	UK DEAL	1	Provided in GIS format; clipped to study area	Y	Y	Y
Oil and gas surface platforms	Details of surface platforms	UK	UK DEAL	1	Provided in GIS format; clipped to study area	Y	Y	Y
Oil and gas pipelines	Details of oil and gas pipelines	UK	UK DEAL	1	Provided in GIS format; clipped to study area	Y	Y	Y
Renewables								
Approved and proposed offshore windfarm sites	Locations and other details of approved and proposed offshore windfarms	UK	Crown Estate	1	Supplied in GIS format; additional data added	Y	Y	Y
Proposed and exploratory offshore windfarm sites		Ireland	DCMNR Foreshore Licensing	1	Digitise co-ordinates and import into ArcGIS8	Y	Y	Y
UK Irish Sea offshore wind SEA area	Area in Eastern Irish Sea for which offshore wind SEA being undertaken	Liverpool Bay (Eastern Irish Sea)	DTI	1	Digitise co-ordinates and import into ArcGIS8	Y	Y	Y
Ireland Irish Sea offshore wind energy potential areas	Maps of potentially exploitable offshore wind energy on Irish coast	Ireland and N Ireland	DETI/Dept of Public Enterprise	2	Hold copy of report - seek data in GIS form	Y	N	N
Tidal barrage study sites	Location of tidal barrage study sites	Eastern Irish Sea	Irish Sea Study Group	2	Digitise and import into ArcGIS8	Y	N	N
Marine aggregates								
Marine aggregate extraction sites	Details of licenced/leased extraction sites	UK (no licenced sites in Ireland ISP area)	Crown Estate	1	Supplied in GIS format	Y	Y	Y
Extraction areas	Details of actual extraction areas within licenced sites	UK	BMAPA/CE	1	Requested and awaiting data in GIS form	Y	Y	Y
Proposed extraction site	Details of application site Aggregate area 457	Liverpool Bay	ERM	1	Digitise zoning from coordinates and import to ArcGIS8	Y	Y	Y
Coast protection								
Coast protection structures	Location of coast protection structures	England	EA	1	Supplied in GIS form	Y	Y	Y

Title	Description	Area covered	Source organisation	Priority	Conversion required and comments	Data received	Data converted	Map completed
Flood defence structures	Location of flood defence structures	England	EA	1	Supplied in GIS form; convert to linear features	Y	Y	Y
Coast protection and flood defence	Location of coast protection and flood defence structures	Wales	WAG/EA	1	Data agreed; import into ArcGIS8	N	N	N
Coast protection and flood defence	Location of coast protection structures	Scotland	SE Environment Group	1	Data agreed: tabulate and import into ArcGIS8	Y	N	N
Coast protection and flood defence	Location of coast protection structures	N Ireland		1	Import into ArcGIS8	N	N	N
Coastal land use								
Coastal population	Locations of coastal settlements and their population sizes	Irish Sea	Digital Map Data (2003) © The DataStore & Bartholomew Ltd	2	Supplied in GIS format	Y	Y	Y
Developed coast	The distribution of urban/industrial development	Irish Sea coast (at different scales)	UKHO	2	Obtained from vector chart data	Y	Y	Y
Coastal development	Existing and proposed coastal development of potential marine environmental significance	Irish Sea	Data sourced from JNCC Coastal Directories & CEFAS	1	Compiled through contract with BMT Cordah	Y	Y	Y
Marine developments	Developments consented under FEPA.	E& W	Defra	1	Convert into Access and import into ArcGIS8	Y	Y	N
Recreation & tourism								
Bathing Waters	Location of EU-listed bathing waters	E&W	EA	2	Imported into ArcGIS8	Y	Y	Y
Bathing Waters	Location of EU-listed bathing waters	Scotland	SEPA	2	Imported into ArcGIS8	Y	Y	Y
Bathing Waters	Location of EU-listed bathing waters	N Ireland	DOENI	2	Collate and import into ArcGIS8	Y	N	N
Bathing Waters	Location of EU-listed designated bathing.	Ireland	EPA	2	Collate and import into ArcGIS8	Y	Y	Y
Bathing Waters	Location of EU-equivalent bathing waters	IOM	DLGE	2	Collate and import into ArcGIS8	Y	Y	Y
Blue Flag beaches	Blue Flag beaches (2003 awards)	UK	Encams	2	Collate and import into ArcGIS8	Y	Y	Y
Blue Flag beaches	Blue Flag beaches (2003 awards)	Ireland	An Taisce	2	Collate and import into ArcGIS8	Y	N	N

Title	Description	Area covered	Source organisation	Priority	Conversion required and comments	Data received	Data converted	Map completed
Marinas	Locations of existing and proposed marinas and numbers of berths.	UK	RYA Marina Guide/Anatec UK Ltd	1	Added Irish marina data and proposed marina developments	Y	Y	Y
Marinas	Locations of existing and proposed marinas and numbers of berths.	Ireland	IYA	1	Added data to UK table	Y	Y	Y
Watersports	Locations of Sailing Clubs and Teaching Establishments.	UK	RYA	2	Digitise paper records and import to ArcGIS8	Y	N	N
Watersports	Locations of Sailing Clubs and Teaching Establishments.	Ireland	IYA/Marine Institute	2	Digitise paper records and import to ArcGIS8	Y	N	N
Marine inputs								
Wastewater discharges	Location and details of wastewater and industrial discharges	E&W	EA	2	Import into ArcGIS8	Y	Y	N
Wastewater discharges	Locations of discharges, population equivalents and treatment	IOM	DLGE	2	Supplied in GIS format	Y	Y	Y
Wastewater discharges	Location and details of wastewater and industrial discharges	Scotland	SEPA	2	Import into ArcGIS8	Y	N	N
Wastewater discharges	Location and details of wastewater and industrial discharges	N Ireland	DOENI	2	Requested from DOENI	N	N	N
Wastewater discharges	Location and details of wastewater and industrial discharges	Ireland	Marine Institute/EPA	2	Requested from EPA	N	N	N
Riverine inputs	Maps showing N & P inputs from riverine sources	E&W	Environment agencies	2	Collate and import into ArcGIS8	Y	Y	N
Sensitive areas	Location of areas identified under the Sensitive Areas (Eutrophic) Directive	Irish Sea	Environment agencies	1	Collate and import into ArcGIS8	Y	Y	N
Classification of shellfish beds	Location and classification of shellfish beds under the Shellfish Hygiene Directive	E& W	EA NCEDS	2	Collate and import into ArcGIS8	Y	Y	N
Classification of shellfish beds	Location and classification of shellfish beds under the Shellfish Hygiene Directive	Scotland	SEPA	2	Collate and import into ArcGIS8	Y	N	N
Classification of shellfish beds	Location and classification of shellfish beds under the Shellfish Hygiene Directive	N Ireland	DOENI	2	Collate and import into ArcGIS8	N	N	N

Title	Description	Area covered	Source organisation	Priority	Conversion required and comments	Data received	Data converted	Map completed
Classification of shellfish beds	Location and classification of shellfish beds under the Shellfish Hygiene Directive	Ireland	EPA	2	Requested from EPA	N	N	N
TBT contamination	Contamination of the Irish Sea coast by TBT in 1997 as indicated by the deformity (VDSI) of dog whelks.	Irish Sea	Fisheries Research Service (FRS Report 5/98).	2	Imported data into ArcGIS8	Y	Y	Y
Marine litter	Estimated quantities recovered off beaches in the Irish Sea (Beachwatch 2001 report)	UK	EA NCEDS/ Cumbria Marine Litter/MCS	2	Collation and importing into ArcGIS8	Y	N	N
Submarine cables								
Submarine cables	Locations with supporting data on type, in or out-of-service, date of installation	Irish Sea	Global Marine Systems	1	Supplied in GIS format	Y	Y	Y
Military activities								
Military practice and exercise areas	Details of coastal and sea firing & bombing ranges etc and vessel exercise areas (PEXA)	Irish Sea	METOC/UKHO (some data also provided by MOD)	1	Supplied in GIS format	Y	Y	Y
Ordnance disposal areas	Map of ordnance disposal areas	Irish Sea	UKHO	1	Obtained from vector chart data	Y	Y	Y
Archaeological								
Protected wrecks	Details of wrecks designated under UK Protection of Wreck Orders	UK	UKHO Wreck Section/ CADW	2	Data supplied as paper records; digitised and imported into ArcGIS8	Y	Y	Y
Scheduled Ancient Monuments	Details of Scheduled Ancient Monuments adjacent to or below mean high water mark	England	English Heritage	2	Imported into ArcGIS8 and clipped to study area	Y	Y	Y
Scheduled Ancient Monuments	Details of Scheduled Ancient Monuments adjacent to or below mean high water mark	Wales	CADW	2	Digitised and imported to ArcGIS8	Y	Y	Y
Scheduled Ancient Monuments	Details of Scheduled Ancient Monuments adjacent to or below mean high water mark	Scotland	RCAHMS	2	Data clipped to study area	Y	Y	Y
Scheduled Ancient Monuments	Details of Scheduled Ancient Monuments adjacent to or below mean high water mark	N Ireland	EHS/ University of Ulster, coleraine	2	Digitised and imported to ArcGIS8	Y	Y	Y
Scheduled Ancient Monuments	Details of Scheduled Ancient Monuments adjacent to or below mean high water mark	Ireland	Duchas	2	Data requested in GIS form	Y	Y	Y

Annex 2 Irish Sea Pilot: Preliminary study on biological & hydrographic information; Collation of biological data

Irish Sea Pilot Scheme: Preliminary study on biological & hydrographic information

Collation of biological data

May 2003

Kate Northen

Report to the Joint Nature Conservation Committee, Peterborough

from Sea-Scope, Marine Environmental Consultants

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1. Introduction

The main aims of this Project were:

- to collate biological data from relevant information holders for the pilot scheme area of the Irish Sea;
- to ensure that the data gathered complies with the mandatory fields specified within the Marine Recorder database and with the additional preferred fields (where possible);
- to establish the terms of release of the data with the information holders; and
- to prioritise available data for data entry into Marine Recorder in consultation with the JNCC project officer.

All relevant data were to be entered into the Marine Recorder database.

As an end product of the contract, data entered into Marine Recorder have been downloaded and sent to JNCC (on CD), along with spreadsheets containing raw data (where applicable). The purpose of this short report is to provide details of the datasets located during the project and to indicate which datasets have been entered into Marine Recorder and which have not.

2. Background

One of the key recommendations of the Review of Marine Nature Conservation Working Group (March 2001) was the promotion of a Pilot Scheme, at a regional scale, to demonstrate the application of the 'regional seas concept', and examine how far the conservation management needed within the pilot area could be delivered through existing systems. The Irish Sea was chosen as the pilot area.

The specification for the Pilot Scheme includes the collation and mapping of information for the Irish Sea in a Geographical Information System (GIS). A Preliminary Study identified:

- what information was essential for the successful completion of the Pilot Scheme;
- whether that information was available and, if so, who held it and on what terms it could be used by the Pilot Scheme; and
- the form in which the information was held, and whether that has implications for the cost of processing the information, and/or the system used by the Pilot Scheme for holding, analysing and mapping the information.

The information required relates to the area seawards of the high water mark and the upper limit of estuaries to cover the entire area of the Irish Sea, south of a line between the Mull of Kintyre and the Antrim coast in the north, and north of a line between Pembroke and Waterford in the south.

This project (as reported upon here) was intended to gather biological data from the Irish Sea and to input suitable data into Marine Recorder.

3. Organisations contacted

As part of the contract, many organisations were contacted in order to establish what suitable datasets were available for entry onto Marine Recorder. The following organisations were contacted to supply biological data. The table in Appendix I provides further details of the organisations contacted and whether or not data were available.

Aquafact
Ecoserve
ERT (Scotland) Ltd
Fehily Timoney & Co
FRS Aberdeen
Ivor Rees (formerly University of Wales, Bangor)
Millport Marine Station
Natural Power
Port Erin Marine Laboratory, Isle of Man (also CMAS)
Solenvo

4. Datasets acquired

The following table lists the surveys for which data have been added to Marine Recorder. Data from a total of **19 surveys** were entered, consisting of **761 survey events** and **863 sample replicates**.

SURVEY DATE	SURVEY NAME	DATA SUPPLIER*	SURVEY EVENTS	SAMPLES
Mar 2002	Robin Rigg Wind Farm proposal sublittoral survey	Natural Power	40	40
Nov 2001-Apr 2002	Robin Rigg Wind Farm proposal fish trawl survey	Natural Power	93	93
Apr - May 2001	CMACS Hamilton Liverpool Bay sublittoral survey	CMACS	55	55
Sept 2000	CMACS Hamilton East, Liverpool Bay beam trawl survey	CMACS	6	6
Sept 2000	CMACS Hamilton East, Liverpool Bay sublittoral survey	CMACS	13	13
Jan 1998	ERT Irish Sea block 112/15 sublittoral survey	ERT	16	32
Jun 1997 – Jul 1998	BIOMOR 2 Irish Sea sublittoral survey	Bensis Report via JNCC	125	None
Jul 1996	Port Erin Marine Laboratory Irish Sea block 112/29A sublittoral survey	Port Erin Marine Laboratory	42	42

SURVEY DATE	SURVEY NAME	DATA SUPPLIER*	SURVEY EVENTS	SAMPLES
?1996	Port Erin Marine Laboratory north Isle of Man *Modiolus* bed sublittoral survey	Port Erin Marine Laboratory	1	1
Sept 1995	ERT Irish Sea block 109/5 sublittoral survey	ERT	15	15
Sept 1995	ERT Irish Sea block 112/15 sublittoral survey	ERT	19	19
Aug 1995	ERT Irish Sea block 112/29A sublittoral survey	ERT	3	3
Nov 1994	ERT North Irish Sea Offshore baseline sublittoral survey	ERT	16	16
May 1991	SOS Irish Sea block 110/2a sublittoral survey	Ivor Rees	15	29
Jun 1989	SOS Irish Sea block 110/2a sublittoral survey	Ivor Rees	42	84

Jun 1987	SOS Irish Sea block 110/2a sublittoral survey	Ivor Rees	59	118
May 1986	SOS Irish Sea block 110/2a sublittoral survey	Ivor Rees	52	102
Apr-May 1985	SOS Irish Sea block 110/2a sublittoral survey	Ivor Rees	46	92
1971-2	MSL Dublin Bay benthic grab sublittoral survey	Scientific paper supplied by JNCC	103	103

*Contact details of data suppliers:

Natural Power: The Green House, Forrest Estates, Dalry, Dumfries and Galloway DG7 3XF. Contact: Jeremy Sainsbury, tel. 01644 430008.

CMACS: The University of Liverpool Centre for Marine & Coastal Studies, A division of Environmental Research & Consultancy (ERC), **Port Erin Marine Laboratory**, University of Liverpool, Port Erin, Isle of Man IM9 6JA. Contact: Dr Terry Holt, tel. 01624 831018.

ERT (Scotland) Ltd: Research Avenue 1, Heriot-Watt University, Riccarton, Edinburgh EH14 4AP. Contact: Dr Iain Matheson, tel. 0131 4495030.

Ivor Rees: formally School of Ocean Sciences, University of Wales, Bangor.

4.1 Accompanying CD

Accompanying this report is a CD with the final NBNdata.mdb Marine Recorder data file and the MS Excel spreadsheets used to import sample data into Marine Recorder. Where available, spreadsheets containing the raw data have also been included.

A CD-ROM *Isle of Man Intertidal Mapping Project*, supplied by CMACS, has also been enclosed with this report.

4.2 Reports supplied

All the reports provided by data suppliers have been included with this report for retention by JNCC.

4.3 Problems encountered with accessing data and suggested solutions

We feel it appropriate to point out a number of problems which were encountered during the course of the data acquisition process, so that, should this exercise be repeated at some time in the future, these problems will be anticipated and, hopefully, remedies sorted out some time in advance.

- The process of sourcing and acquiring datasets is not a simple task. During this contract it was found that, since organisations contacted to supply data were under no contractual obligation to do so, they did not place a high priority on sending data on. Consequently, a very tedious process was involved, involving a lot of time chasing up promises of data that typically took some time to materialise.
- As indicated above, the process of acquiring data is a lengthy task. It is suggested that any such similar data acquisition projects in the future allow sufficient time to give organisations contacted a reasonable lead-in time to respond to requests for data.
- Perhaps a ‘pool’ of other data could be made available to consultancies as an incentive for them to release their own data. Even if data are in the public domain, they may not be readily available in a format or with the information required for entering into Marine Recorder. Data manipulation and extraction takes time for which consultancies (quite justifiably) would seek financial recompense.

Difficulties encountered:

- Data collected but not yet published/worked up – so consultancies or institutions are reluctant to release the data.
- Even data that are supposedly in the public domain have been hard to get hold of – all for understandable reasons. Basically, there is no time for consultancies or institutions etc. to locate the data, ensure the data is in a useable and understandable format, and to release the data.

One possible solution to this problem would be to introduce a system which required that all data collected with public money and in the 'public domain' have to be lodged with a relevant authority (possibly JNCC or the individual country nature conservation agencies). Essentially, this would amount to providing a copy of the survey report and any associated raw data files (commonly, species matrices in spreadsheets or an Access database). Any such reports would then be readily available and truly in the public domain. At the time of handing over of this information, a signed standard Data Release Form could be returned, which would thereby avoid the need to track down issues of copyright, particularly in the Oil and Gas industry where the ownership of companies and their subsidiaries may change in quick succession – leaving the new parent company knowing very little about the original research.

It is quite possible that much of the inshore data are already voluntarily submitted to the local offices of the Country Agencies, but there is no overall system to track down what data have been produced and who holds them. For offshore operations, logically the data would go to JNCC.

Recommendation:

It would make sense for a process to be introduced whereby all organisations generating new survey data that are supposedly in the public domain are obliged to ensure that a copy of the data in question is deposited at a central depository, and that access to the data (if in the public domain) should be available to all.

Appendix 1: Table of contacts

ORGANISATION / INDIVIDUAL	CONTACT	DATA HELD	COMMENT	DATA ACQUIRED
Aquafact	Dr Brendan O'Connor		Confidential data – Not suitable for release	×
Ecoserve	Chris Emblow	BioMar data – already held by JNCC. EIA data for Irish coast.	No available time to extract data from Ecoserve database. Most recent EIAs not available for release.	×
ERT (Scotland) Ltd	Dr Ian Matheson	Environmental surveys for Irish Sea oil & gas blocks	Reports & data supplied.	✓
Fehily Timoney & Co	Declan Egan	Environmental engineering and scientific consultancy sub-contracted Ecoserve to undertake biological EIA of Arklow Bank offshore windfarm.	Fehily Timony unable to contact client for data release. Ongoing over a number of months.	×
FRS Aberdeen	Dr Ray Johnson	Acting as main contact for the lab.	Supplied *Nephrops* distribution maps in PDF format. No data readily available for entry to Marine Recorder. A major undertaking requiring much time to sort through data that is held by FRS – No time available at FRS.	×
	Dr Trevor Howell	Data for scallop trawls and by-catch.	Insufficient time available at FRS to extract data into a format that could be passed on.	×
Ivor Rees (formerly University of Wales, Bangor)	-	Environmental surveys, undertaken by School of Ocean Sciences, Bangor, for Morecambe Bay oil & gas block.	Data supplied.	✓
Millport Marine Station	Dr Geoff Moore	Various research projects.	None of data considered suitable	×
	Dr Peter Barnett	Long-term time series data for Kames bay.	Data not available for release until after publication.	×
	Dr Jim Atkinson	Holds data relating to *Nephrops* in the Clyde Sea. R	Report supplied to Chris Lumb – but no associated data suitable for entry to Marine recorder (density maps only). Spoke again in April – Millport do hold Nephrops data but this is not in a format that is readily available. It would take time to sort through at Millport. Due to academic pressure – no time to address this until end May. Too late for this project.	×

ORGANISATION / INDIVIDUAL	CONTACT	DATA HELD	COMMENT	DATA ACQUIRED
Natural Power	Jeremy Sainsbury	EIA data from proposed Robin Rigg wind farm development in the outer Solway Firth.	Supplied benthic trawl data.	✓
Solenvo Marine Environmental Consultants	Jane Lancaster	EIA data from proposed Robin Rigg wind farm development in the outer Solway Firth.	Supplied fish trawl data.	✓
Port Erin Marine Laboratory, Isle of Man (also CMAS)	Dr Terry Holt	Various datasets for Isle of Man area.	Supplied data for Hamilton & Marathon oil & gas blocks.	✓
	Matthew Moseley	PhD student with data collected from Isle of Man *Modiolus* beds.	Data promised, chased up many times but never arrived.	×

Annex 3 Irish Sea Pilot Project: Financial and employment statistics

Irish Sea Pilot Project: Financial and employment statistics

November 2003

Hazel Lindsay and Richard Stocks

Report to the Joint Nature Conservation Committee, Peterborough from Posford Haskoning Ltd

Contents

1. Introduction

1.1 Project background

The Irish Sea Pilot project is funded by DEFRA until March 2004 to 'pilot test' a new 'marine nature conservation framework' developed by the UK statutory nature conservation agencies for the Review of Marine Nature Conservation (RMNC). The framework is designed to apply the 2 principles of using a whole ecosystem approach and managing the sea at a regional scale.

The Irish Sea was chosen as, with its semi-enclosed geography, it is one of the more recognisable and ecologically distinct regional seas around the UK. It has a wide range of stakeholders and activities and management requires the involvement and agreement of all the devolved administrations of the UK and Ireland as well as the Isle of Man.

The pilot scheme is being managed by the Joint Nature Conservation Committee (JNCC) under agreement to the Department of Environment, Food and Rural Affairs (DEFRA). As part of its work, the Irish Sea Pilot Project has collated information on the natural resources of the Irish Sea and human activities undertaken in, or dependent on, the Irish Sea. This information allows a comparison to be made between human activities and the distribution of natural marine habitats and flora and fauna populations.

To date, the Irish Sea Pilot has not collated information on the contribution made to national prosperity or employment by human use of the Irish Sea within the various human activity sectors. Posford Haskoning has been contracted by JNCC to collate available financial and employment statistics on these human activity sectors.

1.2 Objectives of contract

The objectives of the contract as defined by JNCC are as follows:

- to estimate, to the extent practicable, the contribution to the economy and to employment of selected human activity sectors undertaken in, or which are dependent on, the Irish Sea;
- to identify any medium-term trends in this information;
- identify the problems associated with such an information collation exercise.

1.3 Pilot scheme boundaries

The working geographical boundaries of the Irish Sea pilot are drawn as follows:

- to the south, through the St Georges Channel from Linney Head, Wales to Mine Head, Ireland
- to the north, through the North Channel from Mull of Kintyre in Scotland to Fair Head in Northern Ireland.

1.4 Approach taken

The approach taken by Posford Haskoning to this project has been to review available data from a variety of relevant sources. This data includes available statistics, websites and other reports. If the information was available on a website the information was accessed directly. If however, the website referred to information and data held by an organisation, then project staff contacted the organisation and requested the data.

Pugh and Skinner produced important research for the Inter-Agency Committee on Marine Science and Technology (IACMST 2002). This research estimated the total annual turnover in marine related sectors in the UK in 1999-2000. This total UK marine related turnover is £69bn. In addition to this a value-added turnover is calculated from activities and sectors closely linked to and dependant upon the direct marine related sectors. An example of value added industries would be the trawler servicing and construction industry associated with the fisheries sector. In total the marine related value-added turnover in the UK is estimated at an additional £38.9bn. Unfortunately, Pugh and Skinner's data was collected in such a way that Irish Sea information could not be separated from the main dataset. However, Pugh and Skinner's methodology has been used where appropriate.

The Irish Sea coastal area is dominated by the cities of Liverpool, Dublin and Belfast. Each of these cities developed in response to the need for port facilities by industry and commerce. The rest of the coastal area of the Irish and Celtic Seas is relatively thinly populated and essentially devoted to agriculture. Much of the Scottish and Welsh coasts bordering the Irish Sea have densities of population of less than one hundred people per square kilometre, whereas the average figure for Britain is 241 people per square kilometre (DEFRA 2000).

The key human activity sectors of the Irish Sea were identified previously by JNCC. From this prioritised list of activity sectors, a list of key organisations and data holders was identified. This prioritised list lead the data searching undertaken by Posford Haskoning.

Information was sought for the contributions made to the economy by the Irish Sea, or proximity to the Irish Sea for the following topic areas;

1 Sea Fisheries including
   a) finned fish, and
   b) shellfish
2 Mariculture
3 Ports and shipping
4 Ferries
5 Naval establishments
6 Renewable energy
7 Oil and gas
8 Marine aggregates
9 Tourism and recreation
10 Sea based recreation.

2. Data limitations

2.1 Spatial scale

The sources of data used in this report have been obtained from a very wide range of organisations and data sources. Almost none of the data used has been gathered specifically for the purpose of the consideration of the Irish Sea or with the aims of the Irish Sea pilot study in mind. Therefore the spatial scale, comprehensiveness, data quality and underlying objectives of the data utilised in this report are variable, patchy and often not comprehensive. It is recognised that errors in data are likely to be compounded through estimation and further analysis.

The authors have attempted to amalgamate and adapt the data to fit the area of search. In most cases there is no easy way to be able to re-target the data to be applicable to the Irish Sea. Therefore estimations and assumptions have to be made to provide an indication of the true picture. For example;

- OSPAR Region III is an excellent source of information but also includes the Celtic Sea
- National Office of Statistics – data is split into national levels
- Regional data at council level is patchy in its geographic coverage.

2.2 Temporal scale

The data collated for this study has been collected over a range of differing timescales. Some data is recorded on an annual basis, but most often data gathering is driven by a variety of factors, which result in an ad hoc, disjointed data set across the sectors of interest to this project. This temporal variation in data has present problems in linking and amalgamation of the data sets. The collation and comparison of data sets collected over widely varying temporal scale presented significant problems of compounding errors in the data. These errors may be further exacerbated when data of variable quality and gathered by differing techniques was considered together.

2.3 Data quality

The majority of the datasets used do not contain details of the methods used to collect the data, therefore this presents difficulties in comparing or consolidating a number of separate datasets.

To draw together the various data sources into an Irish Sea context (and in order to have confidence in the resulting dataset), there is a significant amount of further work to be done sourcing the data, analysing how the data was collected and collating into a form that can be used with confidence. The work involved in providing a collated data set is significant and would falls outside the remit of the present study however, trends within the data have been identified as far as possible.

2.4 Differences between sectors

Different sectors (e.g. fisheries and tourism) collect data in different ways and differing levels of quality and comprehensiveness. This often reflects statutory reporting requirements and commitments. For example, to comply with EU and UK legislation, fishery sector data is often very accurate (especially relating to landing numbers) whereas tourism data are often estimates as there is little imperative for standardised data gathering and reporting. This

means therefore that aggregating the economic revenue generated will compound these errors.

Information for some sectors for and in some topic areas does not exist (or cannot be accessed). Examples being;

- tourism in areas such as the West of Scotland
- naval figures sectorally,
- oysters/mariculture where only one producer is present in an area
- accommodation revenue and employment figures

The naval data and oyster producer problems highlight the larger problem of commercial sensitivity of data and the need for this data to feed into the larger dataset. For example, it is very difficult to access data on turnover of the individual ports and ferry companies in the Irish Sea area as this data is often seen as commercially sensitive.

3. Data compilation

The information collated in section 4 has been collected from a variety of sources, all of which are referenced in section 5. Within each sector, data relating to the relevant area for each individual country is presented, as is the data for the Irish Sea collectively. Where no pie charts are presented this therefore means that there was insufficient data to allow assumptions to be drawn in this particular sector. Where pie charts are presented it should be noted that extremely large assumptions have necessarily been made to bridge data gaps and shortfalls within the data in order to give a useful indication and representation of the Irish Sea contribution. The authors recognise the shortfalls and the risks in compounding errors in this way, however, we feel that in the absence of more reliable datasets, this gives at least a working approximation.

Where Gross Domestic Product (GDP) had been presented, a figure for Value Added has been estimated where possible. This value has been approximated using Pugh and Skinner (2002) figures. This figure was used in order that comparisons (although very approximate), could be made between the UK as a whole and the Irish Sea in general. Where comprehensive information was not available we have presented relevant statistics rather than contribution to GDP, meaning that no comparison can be made between these figures and Pugh and Skinner (2002) GDP/Value Added estimates.

3.1 Sea fisheries

UK, Isle of Man and Republic of Ireland sea fisheries

The Irish Sea is defined as Area VIIa within division VII of ICES statistical areas used to report and manage fishing activity. This area is a relatively shallow and enclosed water body with an approximate volume of 2,400 cubic km. Within the context of the EU it is a small fishery. The value of fish stocks in the Irish Sea is shown in Table 1. Area VIIa does not have the same geographical boundaries as the Irish Sea defined by the Irish Sea Pilot Project Steering Group. The southern boundary extends further south along the Welsh coast to incorporate the Pembrokeshire coast and Islands and the Port of Milford Haven. The northern boundary extends further north to include the Clyde Sea area. These areas will contribute additional fisheries income to that recorded for area VIIa, but this is difficult to quantify within the scope of this study because statistics are not collected at an appropriately small spatial scale.

Table 1 Live weight and monetary value of national sea fisheries landings by domestically registered vessels to a) the UK, b) the Isle of Man and c) the Republic of Ireland. Monetary values are calculated with an exchange rate of 1.00 Pounds Sterling = 1.43 Euros as on 26.09.03. Values relate to landings in both the UK and abroad.

a) UK	2000	2001	2002
Demersal			
Quantity (‘000 tonnes live weight)	301.0	270.3	242.5
Value (£ million)	302.3	281.1	257.2
Value (€ million)	432.3	402.0	367.8
Pelagic			
Quantity (‘000 tonnes live weight)	311.8	323.7	305.3
Value (£ million)	78.5	114.2	114.4
Value (€ million)	112.3	163.3	163.6
Total Finfish			
Quantity (‘000 tonnes live weight)	612.8	594.0	547.8
Value (£ million)	380.8	395.3	371.9
Value (€ million)	544.6	565.3	531.8

Shellfish			
Quantity ('000 tonnes live weight)	135.4	143.8	137.6
Value (£ million)	169.5	179.1	174.0
Value (€ million)	242.4	256.1	248.8
All Sea Fisheries			
Quantity ('000 tonnes live weight)	748.1	737.8	685.5
Value (£ million)	550.3	574.4	545.6
Value (€ million)	786.9	821.4	780.2

Source: UK Sea Fisheries Statistics.

b) Isle of Man	**2000**	**2001**	**2002**
Demersal			
Quantity ('000 tonnes live weight)	3.6	3.1	3.3
Value (£ million)	0.12	0.019	0.007
Value (€ million)	0.17	0.027	0.01
Pelagic			
Quantity ('000 tonnes live weight)	0.004	0.04	0.05
Value (£ million)	0.002	0.01	0.01
Value (€ million)	0.003	0.014	0.014
Total Finfish			
Quantity ('000 tonnes live weight)	3.6	3.14	3.35
Value (£ million)	0.0122	0.029	0.008
Value (€ million)	0.017446	0.04147	0.01144
Shellfish			
Quantity ('000 tonnes live weight)	3.5	3.1	3.2
Value (£ million)	2.3	2.44	2.65
Value (€ million)	3.3	3.5	3.8
All Sea Fisheries			
Quantity ('000 tonnes live weight)	7.1	6.24	6.55
Value (£ million)	2.44	2.47	2.67
Value (€ million)	3.29	3.49	3.79

Source: Isle of Man Government Department of Agriculture, Fisheries and Forestry.

c) Republic of Ireland	**2000**	**2001**	**2002**
Demersal			
Quantity ('000 tonnes live weight)	36.8	43.0	40.0
Value (£ million)	45.7	66.6	55.0
Value (€ million)	65.3	95.2	78.7
Pelagic			
Quantity ('000 tonnes live weight)	206.6	223.7	173.1
Value (£ million)	46.1	55.5	44.8
Value (€ million)	65.9	79.4	64.0
Total Finfish			
Quantity ('000 tonnes live weight)	243.4	266.7	213.1
Value (£ million)	91.7	122.1	99.8
Value (€ million)	131.2	174.6	142.7
Shellfish			
Quantity ('000 tonnes live weight)	29.5	31.8	32.1
Value (£ million)	40.4	55.3	47.1
Value (€ million)	57.8	79.1	67.3
All Sea Fisheries			
Quantity ('000 tonnes live weight)	272.9	298.5	245.2
Value (£ million)	132.2	177.3	146.8
Value (€ million)	189.0	253.6	209.9

Source: Department of Communication, Marine and Natural Resources, Republic of Ireland.

Irish Sea fisheries

The most important commercially landed species in the Irish Sea is *Nephrops* (commonly known as the Dublin Bay Prawn or Norway Lobster), caught on the deep muddy grounds to the east and west of the Isle of Man. *Nephrops* are also caught in the Firth of Clyde area which is not included in ICES area VIIa. Other shellfish such as mussels and scallops are also important, although a proportion of the value of mussel landings are likely to come from mariculture. Important scallop grounds are located around the Isle of Man and are the most important fishery of the Isle of Man fleet. Demersal species, in particular cod, are also of importance. Cod stocks have declined significantly over recent years and the value of landings has declined. Pelagic fisheries are of negligible importance in the context of the Irish Sea as a whole.

Table 2 Landings from the Irish Sea by domestic vessels (VIIa) by weight and value to the UK, Republic of Ireland and Isle of Man on the year 2002. Monetary values are calculated with an exchange rate of 1.00 Pounds Sterling = 1.43 Euros as on 26.09.03. Sources: DEFRA Fisheries Statistics Unit; Department for Communications, Marine and Natural Resources, Ireland; Department of agriculture, Fisheries and Forestry, Isle of Man.

	Live weight (tonnes)			Value £ million (€ million)			Total weight	Total (£ mill)	Total (€ mill)
	UK	IOM	RI	UK	IOM	RI			
Demersal	7612	5.5	4260	9.4 (13.4)	0.007 (0.01)	6.4 (9.2)	11878	15.8	22.6
Pelagic	2864	48.9	1025	0.38 (0.5)	0.01 (0.014)	0.2 (0.3)	3938	0.59	0.84
Shellfish	27136	3228	22111	21.0 (30.0)	2.7 (3.9)	19.8 (28.3)	52475	43.5	62.2
Total	37612	3282	27396	30.8 (43.9)	2.7 (3.9)	26.4 (37.8)	68291	59.9	85.6

Table 3 Top 10 demersal, significant pelagic, and top 5 shellfish species in order of value landed by UK vessels from the Irish Sea (VIIa) in 2002. (Note: This area does not include the Clyde Sea area, nor the Pembrokeshire coast and islands which are additional to area VIIa. Landings shown are UK vessels only but provide an indication of important species in the Irish Sea).

Demersal	Quantity (tonnes)	Value (£ ,000)
Cod	1,162	1,830
Dogfish	1,481	1,455
Skates and Rays	932	950
Sole	168	925
Haddock	594	654
Hake	233	615
Monks or Anglers	249	498
Plaice	576	453
Pollack (or Lythe)	261	353
Conger eels	557	345
Pelagic (other landings negligible)		
Herrings	2,468	343
Sprats	306	31
Horse mackerel	90	9

Shellfish		
Nephrops	4,933	8,154
Mussels	10,900	3,376
Scallops	1,774	3,190
Queenies	5,856	2,246
Cockles	1,250	1,292

Contribution to UK, Isle of Man and Republic of Ireland economies

Table 4 Contribution made by sea fisheries to UK GDP. The term Irish Sea refers to ICES area VIIa. Monetary values are calculated with an exchange rate of 1.00 Pounds Sterling = 1.43 Euros as on 26.09.03. Source: UK Sea Fisheries Statistics 2002

Values: £ 'million (€ million)	**2000**	**2001**	**2002**
Value UK GDP	950,415 (1359093)	993,124 (1420167)	1,043,301 (1491920)
Value UK GDP from Agriculture, Forestry & Fisheries (AFF)	8,801 (12,585)	8,241 (11,785)	9,384 (13,419)
Value UK Sea Fisheries	550 (787)	574 (820)	546 (781)
% AFF GDP from Fisheries	6.2%	7.0%	5.8%
% UK GDP from Fisheries	0.058%	0.058%	0.052%
Value of Irish Sea fisheries	25.2 (36.0)	34.6 (49.5)	30.8 (40.0)
IS fisheries as % value of UK fisheries	4.6%	6.0%	5.6%
% contribution of IS fisheries to GDP	0.0027%	0.0035%	0.003%

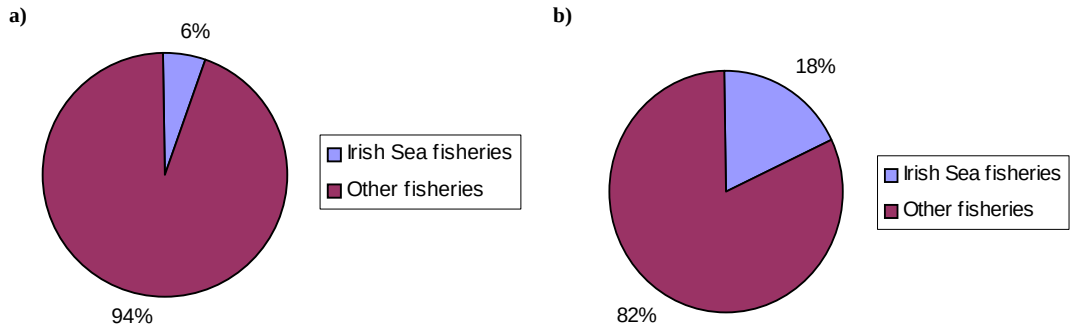
Table 5 Contribution made by sea fisheries to Isle of Man (IOM) GDP. The term Irish Sea refers to ICES area VIIa. Monetary values are calculated with an exchange rate of 1.00 Pounds Sterling = 1.43 Euros as on 26.09.03. Source: Isle of Man Government statistics

Values: £ 'million (€ million)	**2002**
Value IOM GDP	1,058 (1513)
Value IOM GDP from Agriculture, Forestry & Fisheries (AFF)	106 (152)
Value IOM Sea Fisheries	2.7 (3.9)
% AFF GDP from Fisheries	2.5%
% IOM GDP from Fisheries	0.255%
Value of Irish Sea fisheries	2.7 (3.9)
IS fisheries as % value of IOM fisheries	100%
% contribution of IS fisheries to GDP	0.255%

Table 6 Contribution made by sea fisheries to Republic of Ireland (RI) GDP. The term Irish Sea refers to ICES area VIIa. Monetary values are calculated with an exchange rate of 1.00 Pounds Sterling = 1.43 Euros as on 26.09.03. * Year 2000 figures are estimated. Source: Department of Communications, Marine and Natural Resources, Republic of Ireland.

Values: £ 'million (€ million)	**2000***	**2001**	**2002**
Value RI GDP	71,920 (102,845)	80,240 (114,743)	90,450 (129,344)
Value RI GDP from Agriculture, Forestry & Fisheries (AFF)	2,803 (4,008)	2,834 (4,052)	2,794 (3,995)
Value RI Sea Fisheries	132.2 (189)	177.6 (254)	146.9 (210)
% AFF GDP from Fisheries	4.7%	6.3%	5.3%
% RI GDP from Fisheries	0.184%	0.221%	0.162%
Value of Irish Sea fisheries	**19.0 (27.1)**	**31.3 (44.8)**	**26.9 (37.8)**
IS as % value of RI fisheries	**14.4**	**17.6**	**18.3**
% contribution of IS fisheries to GDP	**0.02%**	**0.04%**	**0.03%**

Figure 2 Proportion of a) UK and b) Republic of Ireland sea fisheries income from the Irish Sea (ICES area VIIa). Isle of Man Sea fisheries income comes entirely from the Irish Sea area (Pers comm. Department of Agriculture, Fisheries and Forestry. Isle of Man)



Sea fisheries contribute well under 1% of GDP to the economies of nations surrounding the Irish Sea (See Tables 4 to 6). Expressed in terms of contribution to national fisheries value, the Irish Sea is of greater economic importance to the economies of the Republic of Ireland and the Isle of Man than to the UK (See Tables 4 to 6 and Figure 2). This is probably due the geography of these nations. To the UK, the Irish Sea is a relatively small portion of the surrounding continental shelf that is available to its fishing fleet. For the Republic of Ireland, the Irish Sea represents a greater proportion of immediately adjacent seas and for the Isle of Man, all significant adjacent fishery resources fall within the Irish Sea area.

Employment and fleet size

Table 7 Decline in fleet size and employment in the UK fishing industry. Source: DEFRA Sea Fisheries Statistics 2002

	1993	**1996**	**1999**	**2000**	**2001**	**2002**
Number of vessels	11,108	8,073	7,448	7,242	7,169	7,033
Number of Fishermen	-	19,044	15,961	15,121	14,645	12,746

Summary

- The Irish Sea supports a mixed fishery where Nephrops, mussels, scallops, cod and dogfish are important species. Other shellfish and demersal finfish are also important, but pelagic species make only a small contribution. Shellfish are the most significant fisheries sector for all surrounding nations, but particularly the Isle of Man.
- Although overall landings have remained relatively constant, the number of vessels and people employed in the fishing industry is declining, particularly in the UK.
- Landings from the Irish Sea area are a more important component of the Irish fishing industry (18.3%) than the UK fishing industry (5.6%). Fishing contributes only a very small proportion of GDP to surrounding nations although it is recognised that fishing is important to the economic sustainability of many coastal communities.

UK Revenue from Irish Sea fisheries:	£30.8 million (€40.0 million) (landed value) (VIIa)
% UK GDP from Irish Sea fisheries:	0.003%
% UK GDP from all UK fisheries:	0.058%
Added value factor:	0.55 (Pugh & Skinner, 2002)
Added value for Irish Sea fisheries:	£16.9 million (€22.0 million)
Added value for UK fisheries:	£300 million (€429 million)

3.2 Mariculture

UK

In the UK, finfish mariculture occurs almost entirely in Scottish waters to the north of the study area, with the Coasts of England, Wales and Northern Ireland characterised by shellfish cultivation. Marine species such as cod, halibut and turbot are entering commercial production but at present do not represent a significant contribution to the UK economy.

The total value of shellfish produced in 2000 was estimated at £11.3 million (€16.16 million), from over 15,660 tonnes. This was a significant increase of 50% (weight) and 48% (value) from 1999, due mainly to an increase in mussel cultivation (Shellfish News, 2002).

Mussel production occurs in East Anglia and Wales, with the remainder produced in SW and NW England. Most Pacific oyster production is from the south-west of England, with the rest from the south and south-east of England, east Anglia and a small proportion from Wales. Over 70% of Native (flat) oyster production occurs in the Essex estuaries and the remainder in the south-west of England.

Table 8 Production (Tonnes) of farmed Shellfish in the UK 2000. Source: CEFAS (2002)

	Scotland	England	Wales	Northern Ireland	UK Total
Pacific oyster	247	297	16		
Native (flat) oyster	4	115	0		
Oysters (total)	251	412	16	386	1,065
Scallops	39	0	-	-	39
Queens	58	-	-	-	58
Mussels	2,003	6,131	5,093	1,095	14,322
Clams	-	28	-	2	30
Cockles	-	147	-	-	147
Estimated Value (£'000s)	3,000 (€4,290)	4,500 (€6,435)	2,540 (€3,632)	1,243 (€1,777)	11,283 (€16,135)

Table 9 Annual Scottish salmon production (2000-2002). Source: FRS Marine Laboratory (2002)

	2000	2001	2002 (projected)
Scottish salmon production (Tonnes)	128,959	138,519	159,060
Estimated Value £'000s (€'000)	285,000 (407,550)	-	-

Republic of Ireland

Table 10 Irish mariculture production. Source: CSO (2003)

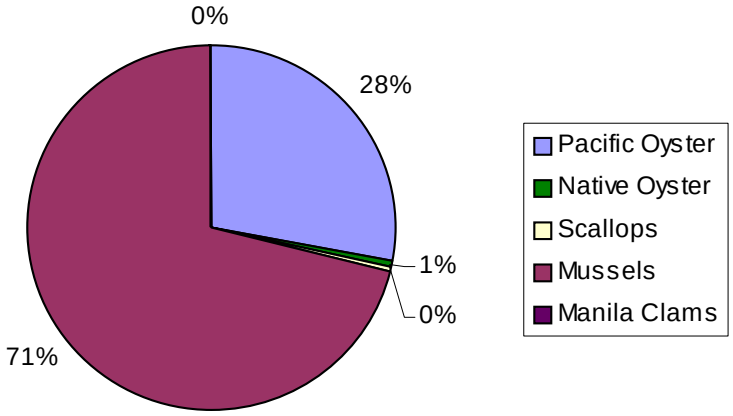
	2000	2001	2002
Shellfish			
Tonnage	31,110	35,853	38,175
Value £'000 (€'000)	15,043 (21,512)	19,541 (27,944)	24,814 (35,484)
Salmon			
Tonnage	17,648	23,312	22,294
Value £'000 (€'000)	42,957 (61,455)	49,559 (70,869)	50,138 (71,698)
Total	58,000 (82,967)	69,100 (98,813)	74,952 (107,182)

Irish Sea

Table 11 Weight and estimated value of mariculture production in the Irish Sea, 2001. Scotland produced 1,375,000 individual cultivated Pacific Oyster in the area in 2001. Cultivated Pacific Oyster weighs 90-110g, estimate of tonnage based on 100g per individual. Monetary values are at first sale and are calculated with an exchange rate of 1.00 Pounds Sterling = 1.43 Euros as on 26.09.03. Sources: CEFAS, FRS, DARDNI, BIM (Irish Sea Fisheries Board)

	Scotland		E & W		NI		RI		Total
	Weight (Tonnes)	Value £'000 (€'000)	Weight (Tonnes)	Value £'000 (€'000)	Weight (Tonnes)	Value £'000 (€'000)	Weight (Tonnes)	Value £'000 (€'000)	Value £'000 (€'000)
Pacific oyster	137.5	321 (459)	15	35 (50)	321.7	656 (938)	2283	2624 (3,752)	3,636 (5,199)
Native (flat) oyster	1 P	-			19.9	87.6 (125)			87.6 (125)
Scallops	1 P	-			11.8	29.7 (42.5)			29.7 (42.5)
Mussels	139	62.5 (89.4)	9000	4,050 (5792)	977	825 (1,179)	9012	4273 (6,111)	9211 (13,171)
Manilla clams					0.84	4.1 (5.9)			4.1 (5.9)
Total	277+	383.5 (548)	9015	4,085 (5842)	1331	1,602 (2,291)	11295	6,897 (9,863)	12,967.5 (18,544)

Figure 3 Value of mariculture production (£'000) in the Irish Sea by species (See Table 16).



Unlike sea fisheries statistics (Section 2.1), data were available for all mariculture farms within the limits of the Irish Sea Pilot Project area. Mussels contribute by far the greatest proportion of production in terms of both weight and value, followed by the Pacific Oyster. Other cultivated species such as the Native (flat) oyster, Scallops and Queen scallops, and Manila clams are commercially farmed but contribute little to the total value of production. There are two salmon farms in the Irish Sea area, one in the Clyde Sea and one off the coast of Northern Ireland. Production information is not available for individual farms and as such, production data for salmon was unavailable, although production from two farms will contribute little in an Irish Sea context.

Contribution to UK and Republic of Ireland economies

The total value of mariculture production in the Irish Sea in 2001 has been estimated to be **£13 million or €18.5 million (See Table 11)**. UK production in the Irish Sea was estimated to be approximately **£6.07 million (€8.68 million)** in this year and Irish production totalled **£6.9 million (€9.86 million)**.

The total value of Irish aquaculture in 2001 was **£74.9 million (€107.1 million)** (Department of Communications, Marine and Natural Resources, Fisheries Statistics 2002). If Irish Sea mariculture production by the Republic of Ireland in this year was worth **£6.9 million (€9.86 million)**, this represents **9.2%** of total production.

The value of national aquaculture production for the UK is available for 2000, standing at **£350 million (€500 million)** (Office of National Statistics 2002)**.** Although this value is likely to have changed by 2001, the variation is unlikely to have changed enough to alter estimates of the contribution of the Irish Sea significantly when 2001 figures are used for this area. If Irish Sea mariculture production by the UK in this year was estimated to be worth **£6.07 million (€8.68 million)**, this represents only **1.7%** of total UK production.

The total contribution of the Irish Sea coasts to the mariculture industries of the UK and Ireland is approximately **3.05%** (€18.5 million/€607.1million). The true figure is likely to be slightly more when undisclosed production from single farms is accounted for. The contribution of mariculture from this region (in terms of GDP) is more important to the Irish economy than that of the UK. Although Irish Sea mariculture is not a significant component of either economy, it is no double locally important for coastal communities in both countries.

Table 12 Contribution made by mariculture to UK and Republic of Ireland GDP, based on 2001 figures. Monetary values are calculated with an exchange rate of 1.00 Pounds Sterling = 1.43 Euros as on 26.09.03. Values are at first sale.

	Total GDP £'million (€'million)	Value IS mariculture £'million (€'million)	% GDP
UK (2001)	993,124 (1,420,167)	6.07 (8.7)	**0.0006**
Republic of Ireland (2001)	80,240 (114,743)	6.9 (9.86)	**0.0086**

Summary

- Irish Sea mariculture production is dominated by shellfish, particularly mussels and the Pacific oyster, which represent approximately 71% and 28% respectively.
- Sustainable management is essential from an environmental, tourism and socio-economic perspective.
- The industry contributes comparatively little in the context of the aquaculture sector and national economies, but is likely to be regionally significant. Salmon production in other areas is of greater economic value (See Tables 13 to 15).

UK Revenue from Irish Sea mariculture:	£6.1 million (€8.7 million) (Value at first sale)
% UK GDP from Irish Sea mariculture:	0.0006%
% UK GDP from UK aquaculture:	0.06%
Added value factor:	0.55 (Pugh & Skinner, 2002)
Added value:	£3.4 million (€4.8 million)
Added value for UK aquaculture:	£334 million (€477 million)

3.3 Ports and shipping

All UK

The collective Associated British Port figures with Mersey Docks and Harbour Company, Clydeport plc and Forth Ports PLC Company showed a turnover of £679m (which scales up to £1690m for all UK ports). Collectively these ports handled approximately 227 million tonnes of cargo in 1999 out of a UK total of 565 million tonnes. **Turnover £1690m Value-added £1183m** (Pugh and Skinner 2002).

Isle of Man

The Isle of Man has main ports; Douglas, Port St Mary, Peel and Ramsey. Douglas is the largest port and handles all the Isle of Man ferries to Heysham, Liverpool, Fleetwood, Dublin and Belfast. The gross registered tonnage for Douglas in 1994 was approximately 4.5 Million tonnes.

Northern Ireland

The port of Belfast is the largest of Northern Ireland's ports and handles over 60% of Northern Ireland's seaborne trade and 25% of trade for the whole island of Ireland. Trade through the port increased by 27% in 1966, achieving another record high for Irish ports. Ship movements through the port are now approaching 20,000 per annum, with the net tonnage reaching 16 million tonnes in 1996.

Other important ports in Northern Ireland are Larne and Warrenpoint. In 1996, the number of commercial vehicles passing through the port of Larne was 280,099 (+11.9% on 1995). The net tonnage of goods passing through the harbour in 1996 was 3.45 million. The number of vessels passing through Warrenpoint in 1997 was 988 an increase of over 40% over 1996. The net tonnage of goods passing through the harbour in 1997 was 1.56 million (North Channel Partnership, 2001).

Ireland

The major ports in Ireland are Dublin, Dun Laoghaire and Rosslare. The total number of cargo and passenger vessel arrivals at Irish ports increased by 40% between 1985 and 1995. The tonnage of cargo handled has also increased by over 60% to more than 32 million tonnes. Just over 7.8 million tonnes of this consists of oil derivatives and chemicals and a further 2.2 million tonnes is crude oil.

Dublin, Ireland's largest port, handled 9 million tonnes of cargo in 1995 (27% of the national total). Over half of this was general cargo from roll-on/roll-off and lift-on/lift-off vessels; 30% was made up of oil derivatives and chemicals, primarily imports of petroleum products and fuel oils. The main export (in terms of tonnage) from Dublin is ore, with over 427,000 tonnes exported in 1995 (North Channel Partnership, 2001). In the same year, Rosslare handled over 1 million tonnes of goods, all from roll-on/roll-off vessels. The UK remains Irelands most important trading partner, accounting for just over 31% of imports and 21% of exports. In 2000 exports from Ireland were £65,881m and imports £43,861. (Port Estates Task Force, 2001).

Scotland

The port on the Clyde is owned and operated by Clydeport. The main import to the port is coal. In 2001, port activities yielded a turnover of £41.4 million (Clydeport 2002).

Irish Sea

The Irish Sea contains very busy shipping routes in both north/south and east/west directions and traffic separation schemes are in operation in the North Channel between Antrim and the Mull of Kintyre; in St. George's Channel between Wexford and St Davids Head, and off Anglesey.

The coastlines of the Irish Sea and Bristol Channel have a number of major ports including Cardiff, Newport, Swansea, Milford Haven and Liverpool/Mersey. Milford Haven and Liverpool/Mersey are the largest followed by a series of specialist small ports of which the ferry ports are the most important. The most important cargo groups are crude and refined oils and other hazardous cargoes; and roll-on/roll-off vehicle and passenger traffic carried by ferries. Other important cargoes are coal, other dry bulk cargoes, container and general cargo traffic (Irish Sea Study Group, 1990).

In the Irish Sea area, there are seven major British ports, handling a combined annual total in excess of 77 million tonnes of shipping traffic. In 1995, the total number of ship arrivals in West and North Wales, Lancashire and Cumbria was 18,475. The most important ports in this region are Milford Haven, Liverpool and Manchester. The Mersey port area is one of the largest commercial ports in the UK and has facilities for the largest ships. Liverpool is the major ferry port in the region, and has ferry routes to Douglas, Dublin and Belfast. The Manchester Ship Canal handles 8 million tonnes of shipping per year. Traffic separation schemes operate in the congested waters off Pembrokeshire and Anglesey (DEFRA 2000).

It has been estimated that, excluding ferry traffic, fishing vessels, warships and offshore supply vessels, in the late 1980s there were approximately 150,000 merchant vessel movements annually through Region III. More recently (1995) 13,000 tanker movements alone were recorded (OSPAR 2000).

Eighty percent by volume of Irelands exports and imports pass through its ports and trade is forecast to continue to rise (OSPAR 2000).

Summary

- Irish Sea ports are extremely important economically. Belfast port alone handles over 60% of Northern Ireland’s seaborne trade and 25% of trade for the whole island of Ireland. Dublin, Ireland's largest port, handled 9 million tonnes of cargo in 1995 (27% of the national total). Clydeport in Scotland yielded a turnover of £41.4 million in 2001.

3.4 Ferries

Scotland – Ireland ferry service

In 1999, 34% of all passengers and 24% of all freight crossing the Irish Sea used the ferry terminals at Stranraer and Cairnryan at Loch Ryan. 1,160 jobs in the Stranraer area depend on these ferry operations with these jobs providing £21 million in wages and salaries to the local economy. It is calculated that 2,540 jobs in Scotland depend entirely on the Loch Ryan ferry operations. In addition, some 541,000 tourist trips are made from Northern Ireland to Scotland with spending from these trips estimated to be £114 million. This spending supports a further 3,800 jobs (North Channel Partnership 2001).

Ireland

Table 13 Sea cross channel visits to Ireland – estimated expenditure. Source:Central Statistics Office, Ireland. * Calculated with an exchange rate of 1.00 Euro = 0.7 United Kingdom Pounds as on 26.09.03.

Estimated expenditure (million)	1998	1999	2000	2001	2002
Euros	527	494	485	513	566
Pounds	369*	346*	340*	359*	396*

The number of vessels arriving at Irish ports increased by 45% between 1985 and 1995 with the tonnage increasing by more than 60% to 32 million tonnes. Ports in the west and south saw an increase in trade of around 14% between 1985 and 1995.

Isle of Man

Considering the most recent published figures, the total number of passenger arrivals to the Isle of Man by ferry was 227,000 in 1993.

Northern Ireland

Belfast is Ireland's largest ferry port handling over 1.8 million passengers, 300,000 freight vehicles and 400,000 passenger cars annually. Other important ports in Northern Ireland are Larne and Warrenpoint. In 1996, the number of commercial vehicles passing through the port of Larne was 280,099 (+11.9% on 1995). Cars and caravans were 208,247 (up 19% on 1995) and passengers were 833,060 (up 25% on 1995) (North Channel Partnership, 2001).

Irish Sea

On the UK coast bordering the OSPAR region III (Celtic Sea), the most important ports are situated on the Mersey Estuary and at Milford Haven but other major ports are found at Port Talbot and the Clyde. Along the Irish Sea coast of England and Wales the seven major ports handle more than 77 million tonnes of traffic with about 18,500 ship movements each year. Although there are numerous island ferry ports scattered along the west coast of Scotland, the Clyde is the only large port on the Scottish west coast and it handles around 1200 vessel movements annually. Holyhead also has regular ferry services to Dublin and Dun Laoghaire. Passenger traffic in the Irish Sea increased by 36% between 1985 and 1995 and car, bus and lorry traffic increased by more than 60% in the same period (OSPAR 2000).

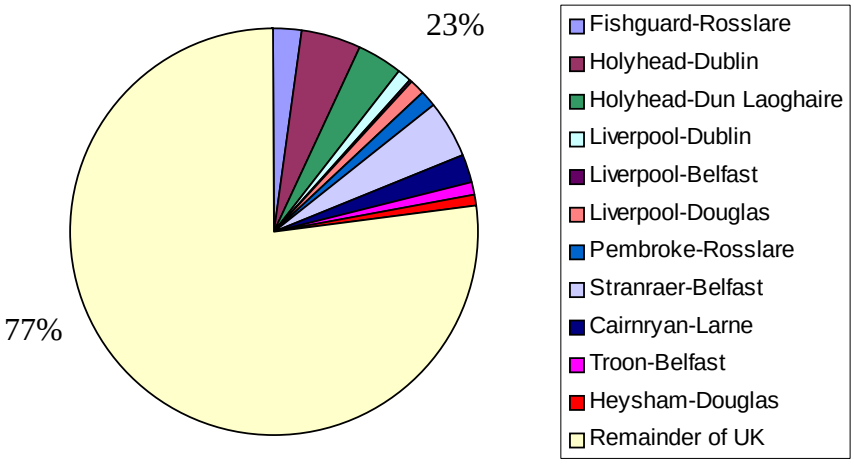
The major ports in Northern Ireland are Belfast, with 60% of the traffic, Larne with 25% and Warren Point with 7.5%. Inward traffic to Northern Ireland has increased by 20% since 1990 and exports have risen by almost 30% in the same period. Belfast is also the largest ferry port in the whole of Ireland with 1.8 million passengers, 300,000 freight vehicles and 200,000 cars annually. Ship movements are approaching 2,000 per year (OSPAR 2000).

MDS Transmodal estimated that in 1999 approximately 5.5 million passengers were carried by ferry between England, Wales and Scotland to Northern Ireland and Ireland through the Northern and Central Corridors. The Northern Corridor is all routes form GB ports (Liverpool, Heysham, Fleetwood, Stranraer, Cairnryan, Troon and Ardrossan) to Northern Ireland ports (Belfast, Larne, Warrenpoint). The Central Corridor has all routes from GB ports (Liverpool, Heysham, Holyhead) to Ireland (Dublin or Dun Laoghaire).

Table 14 International sea passengers on trans- Irish Sea routes in 2002 (Transport Statistics Bulletin, National Statistics Office 2003).

Route of travel	Number of passengers
Fishguard-Rosslare	662
Holyhead-Dublin	1,354
Holyhead-Dun Laoghaire	1,017
Liverpool-Dublin	291
Liverpool-Belfast	137
Liverpool-Douglas	286
Pembroke-Rosslare	387
Stranrear-Belfast	1,296
Cairnryan-Larne	651
Troon-Belfast	332
Heysham-Douglas	252
Total	**6,665**

Figure 4 Internationals sea passengers on trans-Irish Sea routes in 2002 (Transport Statistics Bulletin, National Statistics Office 2003).



Summary

- Irish Sea ferry routes are very important economically. MDS Transmodal estimated that in 1999 approximately 5.5 million passengers were carried by ferry between England, Wales and Scotland to Northern Ireland and Ireland through the Northern and Central Corridors. The Holyhead to Dublin/Dun Laoghaire has shown growth of over 70% between 1990 and 1999 alone.
- The Irish Sea ferry industry employs thousands directly and indirectly.

3.5 Naval establishments

Total UK

All UK Naval operations are considered a contribution to GDP. The total MoD estimate for 1999-2000 was £22.3bn and Pugh and Skinner (2002) estimated that the Royal Navy proportion of this is approximately **turnover £6660m with value-added at £2531m** (Pugh and Skinner 2002)**.**

Irish Sea

Within the Irish Sea area the principal UK naval shipping operations are submarine traffic (most of it nuclear powered and armed) between the two nuclear submarine bases on the Clyde and the Celtic Sea (Irish Sea Study Group, 1990).

Summary

- Extremely difficult to compile any data on this sector.
- Very little known in monetary terms
- Important from a strategic military viewpoint. Plans to upgrade facilities at the HMNB Clyde base highlights the Irish Sea's continued strategic importance.

3.6 Renewable energy

UK

Renewable energy usage is set to increase in order to help reduce greenhouse gas emissions and thereby contribute to national and international targets for emissions reductions. This is reflected in the UK government's target for 10% of the UK's electricity to come from renewable sources by 2010. These increases will be met by harnessing the UK's abundant wave, tidal current and particularly offshore wind resources.

In order to meet this target, the UK government invited wind farm developers to tender for sites for the construction of offshore wind farms of up to 30 turbines in the year 2000. This application process was called "Round 1". 12 projects have already been given the go ahead, and a further 6 have a lease agreement from the Crown Estate but are awaiting final consent through the EIA process. A second phase of "Round 2" large-scale proposals is currently being considered in three strategic areas around England and Wales. These strategic areas were originally identified in November 2002 in the DTI's Future Offshore Consultation. One of these development areas is situated in the Liverpool Bay area of the Irish Sea.

Total generating capacity at the end of 2002 stood at 76,588 MW, of which 2,598 MW (3.4%) was represented by renewable sources (including natural-flow hydroelectric).

Republic of Ireland

Like the UK, the Republic of Ireland has set targets to increase generation capacity from renewable energy sources. A target to reach a capacity of 500 MW over the period 2000-2005 has been set. A number of consortia have been awarded licences to investigate the suitability of sites for offshore wind energy in Ireland by the Department of Marine and Natural Resources.

Total national electricity generating capacity is approximately 4164 MW (IDA, 2003), of which 295 MW is from renewable sources (4%) (Sustainable Energy Ireland, 2003).

Renewable energy in the Irish Sea

According to DEFRA (2000) the wider wind resources of north west coast of England have a generating capacity of 1,600 MW, producing 3,500 GW/yr. Under Round 2, offshore wind power is set to expand significantly in the Liverpool Bay area to exploit this resource. Six offshore wind farm projects in the Irish Sea have already acquired consent under the UK government's Round 1 application/consent procedure. The first of these, North Hoyle, off the coast of North Wales, is due to be completed before the end of 2003 (BWEA, 2003). It

consists of 30 2MW turbines providing a total capacity of 60MW. Once the remaining Round 1 projects are complete they will have a combined capacity of approximately 600MW.

There are 6 proposed sites on the East Coast of Ireland. Of these, the 25 MW Arklow Bank project is due to begin generating electricity by the end of 2003. Initial developments are likely to be constrained to a water depth of 20m and a minimum distance from land of 5km. Despite this, it is estimated that some 32% of Ireland's predicted consumption by 2005 could be met by offshore wind energy (IWEA, 2003).

It has been estimated that wind farms will occupy an area of 135 km^2 by 2010 and 254 km^2 by 2020 in this region, although maximum credible developments could be double this (BMT Cordah, 2003).

Figure 5 Current proportion of a) UK and b) Republic of Ireland renewable electricity generating capacity from the Irish Sea based on offshore wind farms due for completion by the end of 2003. Irish Sea renewables contribution to total capacity is only 0.078% (UK) and 0.6% (Republic of Ireland).

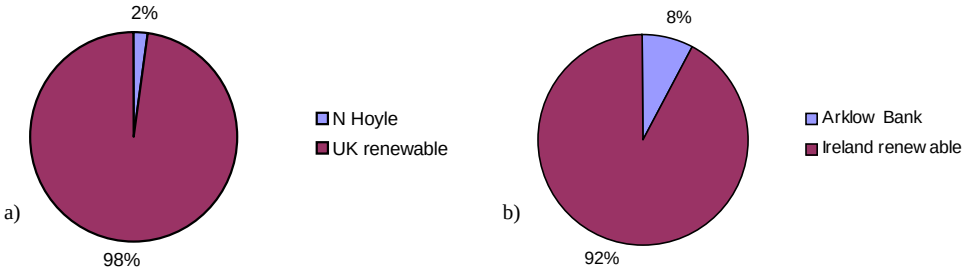


Table 15 Prediction of most likely energy output from Liverpool Bay by 2010 and 2020 if the wind farms proposed are developed. Source: BMT Cordah Limited, Offshore Wind Energy Generation: Phase 1 Proposals and Environmental Report For consideration by the Department of Trade and Industry. July 2003.

	2010 (MW)	Turbine numbers		% UK supply	2020 (MW)	Turbine numbers		% UK supply
		3MW	5MW			3MW	5MW	
Likely scenario	800	267	160	0.8	1500	500	300	1.5
Maximum credible	1500	500	300	1.5	3000	1000	600	3.0

Other potential renewable sources include small scale hydro-electric, wave and tidal power. There is considerable potential for tidal power generation in the upper reaches of the Bristol Channel, in the Conwy, Dee, Mersey, Wyre and Duddon estuaries and in the Solway Firth. Although the region is a strong candidate for wave energy, the technology is not yet sufficiently well developed for this to be a realistic option. For the north west coast of England the potential capacity of tidal energy is estimated to be 1,000 MW with a potential generation of 1,850 GWh/yr. The coasts of Ireland and Scotland are exposed to prevailing westerly winds and waves, which could be exploited by appropriate renewable energy generation schemes (OSPAR 2000).

Table 16 Potential tidal barrage performance in the Irish Sea. Source of data: ISSG (1990); Welsh Office.

	Morecambe	Solway	Dee	Dovey	Mersey
Mean tidal range (m)	6.3	5.5	5.9	2.9	6.4
Basin area (10^6 m^2)	350	860	90	13	70
Barrage length (m)	16,600	30,000	9,500	1,300	1,750
Max water depth (m)	30	28	29	11	25
Installed capacity (MW)	3,000	7,200	840	20	620
Annual energy output (GW)	4,630	10,250	11,160	50	1,320
Cost of energy – 1990 (pence/KWh)	4.3	5.1	6.4	7.2	3.6

Contribution to UK and Republic of Ireland economies

The completion of the North Hoyle offshore wind farm will add 60 MW of capacity, representing only 0.078% of total capacity and 2.3% of total renewable generation capacity. Following completion of the Round 1 wind farm projects and likely additional capacity from Round 2 projects, Irish Sea wind power is projected to represent 0.8% of UK generation capacity by 2010. By 2020 this is projected to be 1.5% (See Table 18).

The electricity industry in the whole UK currently contributes approximately 1.2% to UK GDP.

Table 17 Proportion of UK 2002 GDP represented by projected electricity generating capacity in the UK and Irish Sea. Sources: Office of National Statistics, (2003); BMT Cordah (2003).

	£ million	€ million	% GDP (2002 level)
UK GDP	1,043,301	1,491,920	100
UK electricity generation	125,120	178,922	1.2
UK renewable generation	425.7	609	0.04
Irish Sea renewables 2003 (based on 0.078% UK capacity)	9.77	14.0	0.0009
Irish Sea renewables 2010 (based on 0.08% UK capacity)	100.2	143.3	0.0096
Irish Sea renewables 2020 (based on 1.5% UK capacity)	187.8	268.6	0.018

The completion of the Arklow Bank offshore wind farm will add 25 MW to Irish national electricity generating capacity. This represents 0.6% of total capacity and 7.8% of renewable generating capacity.

The expansion of renewable energy projects in the area, represented in the immediate future by offshore wind, will create additional employment. Most jobs will be created during construction stages with some additional employment required for maintenance and operational needs. BMT Cordah (2003) estimated a minimum of 1-2 full time jobs created for each MW of installed capacity and a maximum of 3-4 per MW, based on previous studies. Job creation estimates for the planned developments in Liverpool Bay are shown in Table 21.

Table 18 Estimate of jobs created by offshore wind farm development in the Liverpool Bay area of the Irish Sea (based on most likely scenario).

	Likely Capacity (MW)	Jobs created
Scenario 2010	800	800 – 3,200
Scenario 2020	1500	1,500 – 6,000

Summary

- The Irish Sea has a great potential for wind and tide energy with the Liverpool Bay area of the Irish Sea being included as one of the three strategic areas around England and Wales identified in November 2002 in the DTI's Future Offshore Consultation for offshore wind development. Numerous applications are currently being considered in this area and off the east coast of Ireland.
- It has been estimated that by 2010, the Irish Sea wind resources could contribute 0.8% to the UK's generating capacity (BMT Cordah, 2003).
- It would be comparatively easy to provide the infrastructure to link into the national grid and the market (i.e. large cities).
- By the end of 2003 the Irish Sea renewable resources will have contributed approximately 0.078% of the total UK and 0.6% Republic of Ireland generating capacity. This is not therefore a significant contribution to the overall UK economy.

UK Revenue from the Irish Sea renewables (2003):	£9.8 million (€14.0 million)
% UK GDP from Irish Sea renewables:	0.0009%
% UK GDP from UK renewables:	0.04%
Added value factor:	0.34 (Pugh & Skinner, 2002)
Added value:	£3.3 million (4.8 million)
Added value for UK renewables:	£145 million (€ 207million)

3.7 Oil and gas

UK

Oil was first discovered in UK waters in 1969, and is now being produced from almost 100 fields to the north and east of Great Britain. There is some oil and gas production in the Irish Sea, but this region has been relatively untouched in comparison to the North Sea. The UK oil and gas industry is already turning its attention to new reserves believed to exist along the Atlantic Margin to the north and west of Scotland as North Sea field mature.

In 2001, oil and gas accounted for 72% of total UK energy consumption, with UK production supplying 97% of gas consumed. About 11% of UK gas production is exported to Ireland via the UK-Belgium interconnector. In the same year, crude oil and natural gas liquids (NGLs) output in the UK averaged 2.4 million barrels (about 320,000 tonnes) a day, making the UK the world's tenth largest producer (Office of National Statistics, 2002).

Republic of Ireland

Ever since Ireland's first offshore well was drilled in the Celtic Sea back in 1971, Irish oil and gas production has been based off the south coast offshore of Kinsale Head and Ballycotton in the Celtic Sea Basin. Ireland's exploration success rate is among the lowest in the world and historically the chances of a commercial find are about one in 50 (IOOA, 2003). Recently the Irish authorities have opened new areas off the West Coast to the oil and

gas industry and it is in these areas such as the Porcupine and Rockall Basins that future activity is expected to occur.

Oil and gas in the Irish Sea

Important sedimentary basins are found to the north and east of Anglesey, and between Cardigan Bay and the Celtic Sea south of the Republic of Ireland. Although sedimentary basins also exist in the Bristol Channel, no oil or gas finds have yet been reported there.

Estimates of undiscovered recoverable reserves in the Southern Basin, Irish Sea and Celtic Sea Basin are between 0-40 million tonnes of oil and 230-595 billion cubic metres of gas. The number of exploration wells drilled in the area increased from five wells drilled in 1995 to eight exploration and two appraisal wells drilled in 1996. Two exploration wells were drilled in Isle of Man territorial waters in 1996 (Department of Trade and Industry, 1997). There are a number of gas-producing fields in the northeastern Irish Sea (See Table 22) with two oil fields, Lennox and Douglas, also in this area (See Table 23).

Table 19 Gross gas production to 2002 in million cubic metres

Field Name	1996	1997	1999	2000	2001	2002	Cumulative to end 2002
Dalton		0	267	471	32	2	772
Hamilton		1,176	1,416	1,685	1,933	1,536	9,498
Hamilton East					167	503	670
Hamilton North	625	667	454	543	553	368	3,756
Millom			29	144	1,023	1,048	2,244
North Morecambe	2,626	2,930	848	3,872	3,017	3,128	10,669
South Morecambe	7,099	6,170	9,971	8,436	8,328	7,513	102,183

Table 20 Crude oil production '000 Tonnes per year (UK share)

Field Name	1996	1997	1999	2000	2001	2002	Cumulative total ('000 Tonnes)
Douglas	768	1,604	937	779	1,118	918	7,448
Lennox	105	454	857	1,376	1,798	1,697	7,182

Contribution to the UK economy

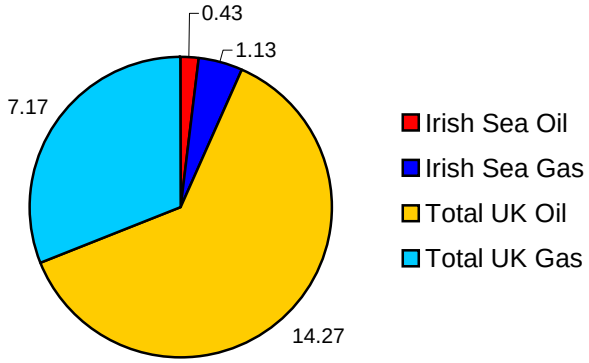
The economic importance of Irish Sea petrochemical production has been estimated using UK wide quantity and value information from the Office of National Statistics. Oil and gas production from fields in the Irish Sea, obtained from the Department of Trade and Industry, allow estimates of the economic value of these fields to be made in the context of the UK as a whole. There are currently no Irish production facilities in the Irish Sea area.

Oil and gas remains the most important of all the UK marine related economic activities. In 2001, total revenues from the sale of oil (including NGLs) produced from the UK continental shelf came to £14.7 billion, and those from natural gas were £8.3 billion. Taxes and royalty receipts rose to £5.1 billion in 2001/2002 (Office of National Statistics, 2002). UK oil and gas production represented 2.4% of the UK's Gross Value Added (GVA) in 2001. Gross Value Added (GVA) measures the contribution to the economy of each individual producer, industry or sector in the United Kingdom (GVA + taxes on products - subsidies on products = GDP). GDP of the oil and gas industry is currently just over 2%.

Table 21. The economic importance of Irish Sea oil and gas production in the context of total UK production based on 2001 figures. Source: UK production, revenue and GVA figures taken from Office of National Statistics (2002).

	Production		Revenue (£ billion)		GDP (%)	
	Irish Sea	UK	Irish Sea	UK	Irish Sea	UK
OIL (Million tonnes)	2.92 (2.77%)	105.5	0.43 (2.9%)	14.7		
GAS (Billion m^3)	15.05 (13.6%)	111	1.13 (13.6%)	8.3		
TOTAL			1.56 (6.8%)	23	0.136	2.0

Figure 6. Economic importance of Irish Sea oil and gas compared to other UK offshore production. Numbers represent sales revenues (£ billion)



Summary

- The oil and gas industry overall is well developed and is an extremely important contributor to the UK economy at approximately 2% of GDP. The industry is far less important to the Irish economy and the only production fields are off Kinsale Head and Ballycotton in the Celtic Sea Basin (outside the Irish Sea area).
- Most UK oil and gas production is concentrated in the North Sea, with comparatively little production from the Irish Sea. Irish Sea production contributes 6.8% of total UK revenues, most of which is represented by natural gas. The economic contribution of the oil and gas production of the Irish Sea to the UK economy is therefore small.

UK Revenue from Irish Sea oil and gas (2001):	£1,560 million (€2200 million)
% UK GDP from Irish Sea oil and gas:	0.014%
% UK GDP from UK oil and gas:	2.0%
Added value factor:	0.72 (Pugh & Skinner, 2002)
Added value:	£1,123 million (€1584 million)
Added value for UK oil and gas:	£16,560 mill (€23,680mill)

3.8 Marine aggregates

UK

In mainland Britain, commercial mineral companies under licence from the Crown Estate extract marine aggregates. There is no equivalent body to the Crown Estate in the Isle of Man and no licences for marine aggregate extraction presently exist for Manx waters. In Northern Ireland there is generally considered to be an oversupply of sand and gravel and there has been little pressure to look beyond existing onshore sources.

Republic of Ireland

There has been no significant extraction of marine aggregates off Ireland in recent years although there has been small-scale extraction of maerl deposits (ICES, 2003). The demand for marine aggregates is growing however as inland sources, particularly those close to large towns, are depleted.

Marine aggregate extraction in the Irish Sea

There are four areas licensed for dredging in the Irish Sea (licensed for sand), two located at the mouth of the River Mersey, one in Liverpool Bay, called Hilbre Swash and the fourth between the Isle of Man and Cumbria. The majority of extraction takes place from the Hilbre Swash licence area. In total 287,000 tonnes was taken from the four licenses in the Irish Sea.

The British Geological Survey (BGS) estimates (Humphreys *et al* 1996) of the total available resources off north Wales, Lancashire and south Cumbria are 476 million tonnes of sand and 10 million tonnes of shingle. However, not all of this material is accessible, mainly due to limitations associated with dredging in deep water.

Contribution to the UK economy

Marine extraction in England and Wales reached a peak of 28 million tonnes in 1989 but has since fallen steadily. The total tonnage extracted in 1997 was 24.9 million tonnes (including 4.9 million tonnes for contract fill and beach nourishment). The 2.3 million tonnes dredged from the Irish Sea and Bristol Channel regions in 1997 represents only 9.4 % of this total (Crown Estate, 1998).

There are about 2500 employees nationally in the aggregate industry, with about 50 directly employed in the north west region. These include dredger crews, shore based office employees and hauliers who transport the sand from the wharf to the site of end use. There is also indirect employment for engineers and dredger repair staff, wharf suppliers and self-employed hauliers (Bellamy 1997).

Table 22. The economic importance of Irish Sea aggregate production in the context of total UK production based on 2000 figures. Sources: Crown Estate, Office of National Statistics 2002.

	Production (Million tonnes)		**Value (£ Million)**	
	Irish Sea	UK	Irish Sea	UK
All sources	0.32	101.6		619
Marine sources	0.32	23.06	1.79	132
% UK GDP (2000) (£950415 million)			0.0002%	0.014%

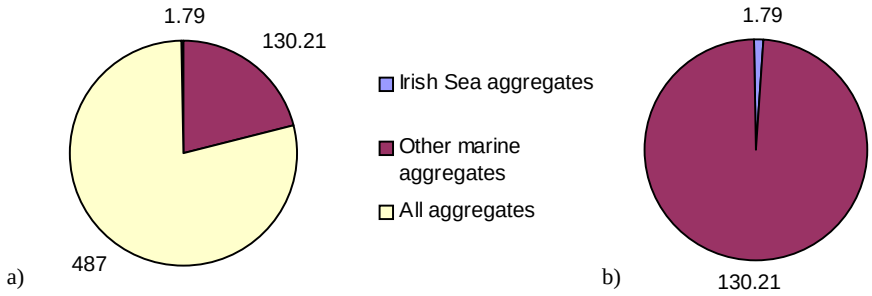


Figure 7 The total Irish Sea contribution (£1.79 million) in (a) total aggregate context, and (b) total marine aggregate context based on 2000 figures.

Summary

- The Irish Sea marine aggregate resources contributed £1.79 million to UK GDP in 2000 representing only 0.0002% of the UK GDP.
- The economic contribution of the aggregate production of the Irish Sea to the UK economy is small.

UK Revenue from the Irish Sea aggregates (2000):	£1.79 million (€2.56 million)
% UK GDP from Irish Sea dredged aggregates:	0.0002%
% UK GDP from UK aggregates:	0.065%
Added value factor:	0.52 (Pugh & Skinner, 2002)
Added value:	£0.93 million (€1.33 million)
Added value for UK aggregates:	£52.8 million (€75.5million)

3.9 Tourism and recreation

Total UK

Since 1968 traditional 'seaside' resorts have seen 33 million to 22 million trips annually. The 'seaside' share of holiday trips by the British has fallen from 75% of the market to 44%. However, in total 27.9 million seaside holidays are taken in the UK equating to £5.1 billion (source: UKTS 2001/ ETC / WTB / Visit Scotland), with an additional £2 billion in day trips (Source: UK day visits survey 1998).

The British Tourist Authority estimated that the total turnover for tourism in the UK in 1999 to be worth more than £64bn per year and that £17bn per annum is related to seaside tourism. However between 1973 to 1998 the share of UK generated tourism nights spent at the seaside fell from 27% to 13% as people are taking longer main holidays abroad. **Turnover £17bn, Value-added £10.7bn.** (Pugh and Skinner 2002).

Northern Ireland

Tourism and the leisure industry play only a minor part in the economy of Northern Ireland. Overall employment in the tourism industry accounts for around 12,500 jobs, only 2.2 % of the workforce. Most of the tourist activity is concentrated on the resorts of Newcastle and Bangor. Parts of Belfast Harbour have been regenerated to provide leisure activities, which include a concert hall and a major hotel. The coastal walk from Holywood to Groomsport passing through Crawfordsburn Country Park is one of regions most popular outdoor coastal attractions. Caravanning is popular on the Outer Ards Peninsula, along the coastline between

Ballywalter and Ballyhalbert, Carlingford Lough and between Dundrum Bay and Newcastle. The largest site in the area, licensed for 650 caravans, is located just south of Ballywalter.

Ireland

In Ireland tourism was estimated as totalling €3,985 million (£2786 million) industry in 2002. Tourism supported 141,000 jobs (or job equivalents) in 2002, with tourism supporting 8% of jobs (equivalent to one in all 12 jobs in the economy). Tourism in Ireland has experienced relatively rapid growth since the late 1980s; almost trebling since 1988 with 4.7 million overseas visitors in 1996. Nationwide, overseas visitors accounted for approximately 45.3 million bednights in 1995 (more than a 25% increase since 1992), many in coastal areas. In addition to overseas tourists, it is estimated that domestic residents took 6.2 million holidays in Ireland in 1996.

Wales

The Welsh Tourist board estimated that the domestic (UK) tourism to Wales in 2001 was in region of £1,543 million. The 'seaside' accounts for 60% of all holidays in Wales. Figures form the Census of Employment shows that there is a consistent trend towards increasing employment in tourism in Wales between 1981 and 1991. Tourism employment in Wales rose from 56,900 in 1981 to 79,300 in 1991, representing an overall increase of 39% over the period. However 1996 tourism employment had declined by 9000 to approximately 70,000. The most recent research conducted by DTZ Pieda (April 1998) estimates that in September 1995, 80,600 workers in Wales were directly dependent upon tourism and leisure for their employment to some extent.

Irish Sea

To the east of OSPAR Region III (Celtic Sea), sectors of coastline with traditionally high influxes of visitors in summer are those bordering the Bristol Channel, Cardigan Bay and Colwyn Bay, the Isle of Man, the Cumbrian coast, the Firth of Clyde, Strangford Lough, outer Dundrum Bay and the south-east coast of Ireland.

In north-west England, tourism supports over 250,000 jobs and in 1994 had a total turnover of £1.5 billion. Tourism in Merseyside is rising and is becoming increasingly important to the local economy. In 1995 16,500 jobs on Merseyside were dependent on tourism spending, an increase of 2,500 on 1990. Blackpool is the largest and one of the most popular coastal resorts in the UK. Despite a decline in its traditional family holiday trade over the past few decades, it still attracts over 17 million individual visits each year with an expenditure of £545 million (North West Tourist Board).

Summary

- Information is poor in terms of being disjointed and discontinuous.
- Foot and mouth hit the tourism industry in the UK very hard, tourism is still not back to pre foot and mouth levels, but is on the increase.
- Tourism is linked to environmental quality of the Irish Sea itself. Environmentally sustainable management of the Irish Sea is needed in order to sustain the tourism of all neighbouring nations.
- Regeneration of many coastal towns such as Blackpool, Rhyl etc is under way in order to attract tourists back to these areas.

- Tourism is extremely important to the economy of the Irish Sea and to the economy of the UK in general. Of the sectors considered within this report, tourism is considered to be one of the most financially important sectors.

3.10 Sea recreation

Total UK

The British Marine Federation figures for the leisure industries in 2000 show 50% of the revenue is from services (including repair berthing, hire charges, brokerage and fuel). In 1998 the total revenue for services and sales was approximately £889m. **Turnover £19.29bn, Value added £11.77bn.** (Pugh and Skinner 2002).

Ireland

Wide range of boating activities undertaken in Irish Seas by 22,000 members of the principle boating organisations in Ireland. There are 8 other similar organisations in Ireland and the UK who have members in the UK and Ireland involved in boating activities but no numbers given in report. These figures are expected to rise but no details given. In Ireland there has been a growing interest in marine and coast-based activities resulting in increasing numbers of people participating in activities such as sea angling and other water sports (sub-aqua diving, boating, water-skiing etc.) It is estimated that in the mid 1990s over 260,000 overseas visitors participated annually in water-based activities, representing 29% of the total outdoor activity market.

Sea angling, which attracted about 40,000 overseas visitors in 1995, occurs all around the coast of Ireland. Sailing and cruising are popular coastal sports especially in the vicinities of Dublin Bay and Cork Harbour. In 1989, an estimated 15,000 people participated in sailing in Dublin Bay alone. Sailing and boating are also popular among overseas visitors; about 56,000 of these visitors engaged in some form of boating during 1996 (Boyd, 2002).

It is anticipated that there will be an increase in sea recreation growth in Ireland with a 25% increase by 2023 (and 55% in Dublin). There will also be a demographic change with a 25% increase in people under 25 in Dublin and a doubling of those in the 45-64 age group in the East of Ireland. Those under 25 are generally more active while those in the 45–64 age group have more disposable income.

The Biennial Dublin Boat Show saw a 25 % increase in attendance from 1999 to 2002 (the 2001 show was cancelled due to foot and mouth) and 42 million Euros was spent. Due to the popularity, the event is now an annual event. More marinas are being built and existing ones are being expanded and this is creating an increase in demand for accommodation, food and entertainment on land.

In Ireland when considering sea angling, national legislation supports the sustainable exploitation of bass stocks by banning most commercial netting of bass. As a result, many thousands of anglers, often with their families, travel to Irish shores each year. The Department of the Marine values sea angling tourism at £17 million per annum.

England and Wales

The northern half of Cardigan Bay is considered to be the second most important sailing centre in Britain after the Solent (Welsh Tourist Board).

Sea angling is another economically significant area of sea recreation. Economic contribution of recreational sea angling to estimated to be £19 million (Dunn et al. 1992). Much of this

spending by recreational bass anglers goes into the coastal and tourism parts of the economy. It creates and sustains many more jobs and businesses than does commercial fishing.

Isle of Man

Sea angling is the most popular water-based leisure activity in the Isle of Man. Most of this is shore-based, but some boats take customers to the surrounding islands.

Northern Ireland

Belfast Lough is a popular sailing resort and the location for the regions two largest marinas (>300 berths) at Carrickfergus and Bangor. Strangford and Carlingford Loughs are popular resorts for water sports and more recently wildlife watching. Around 5,000 people sail regularly on Strangford Lough using around 2,000 crafts and eleven yacht clubs have been established there.

Summary

- This is a growing industry and as such requires appropriate management so it is sustainable.
- The sector is reliant on environmental quality.
- Sea angling attracts large numbers of overseas visitors each year to the Irish Sea area. Sailing and cruising are also popular coastal sports in Irish Sea area.
- The contribution of this sector is of medium importance to the economy of the Irish Sea, however, unlike the fisheries sector, it is not fully exploited and as such shows great potential for growth.

4. Summary

The Irish Sea is an extremely busy water body with a large population on its shorelines, a large tourist industry and significant numbers of commercial ferries and shipping supporting trade through and across the Irish Sea.

Below are summaries of the various sectors considered:

- **Sea fisheries** - Sea fisheries contributes only a very small proportion of GDP to surrounding nations although the sector is likely to be important on a regional basis. Landings from the Irish Sea area are a more important component of the Irish fishing industry (18.3%) than the UK fishing industry (5.6%). The fin fish sector in the Irish Sea is significantly depleted and, under current management, recovery will be slow if possible at all. Those communities that were dependent on the fin fish sector have already felt the economic and social impact of the decline of this fisheries sector. Conversely, the shellfish sector remains economically healthy, making a significant contribution to a relatively small section of the community surrounding the Irish Sea. However, on a national level the contribution is not very significant.

- **Mariculture** - The industry contributes comparatively little in the context of the aquaculture sector and national economies, but is likely to be locally significant.

- **Ports and Shipping** - Irish Sea ports are extremely important economically. Although total GDP or indeed turnover of the Irish Sea ports and shipping was not able to be calculated, the figures for the individual countries and ports all show that this is one of the most economically significant sectors of the Irish Sea.

- **Ferries** - Irish Sea ferry routes are extremely important economically. MDS Transmodal estimated that in 1999 approximately 5.5 million passengers were carried by ferry between England, Wales and Scotland to Northern Ireland and Ireland through the Northern and Central Corridors. The Holyhead to Dublin/Dun Laoghaire has shown growth of over 70% between 1990 and 1999 alone. All though data for the entire Irish Sea area was not able to be consolidated, nonetheless the information available shows an economically important, growing ferry industry that contributes significantly to the overall UK economy.

- **Renewable energy** - By the end of 2003 the Irish Sea renewable resources will have contributed approximately 0.078% of the total UK and 0.6% Republic of Ireland generating capacity. The Irish Sea has a great potential for wind and tide energy (especially within the Liverpool Bay area), however in an overall UK context the contribution made by the Irish Sea is limited. Renewable energy, therefore, does not make a significant contribution to the overall UK economy.

- **Oil and Gas** - Most oil and gas production is concentrated in the North Sea, with comparatively little production from the Irish Sea. Irish Sea production represents 6.8% of total UK revenues, most of which is represented by natural gas. The economic contribution of the oil and gas production of the Irish Sea to the UK economy is therefore small, and furthermore limited in the number of years production can continue.

- **Marine aggregate** -The economic contribution of the aggregate production of the Irish Sea to the UK economy is small.

- **Tourism** - Tourism is extremely important to the economy of the Irish Sea and to the economy of the UK in general. The importance of this sector is growing, and furthermore is probably not being exploited to its full potential. Within the Irish Sea area the types of tourism seem to be spatially different. The west coast of Britain attracts more 'resort' based tourism (for example Blackpool and Rhyl), whereas the west coast of Wales and east coast of Ireland and Northern Ireland attract large numbers of recreational sea users (i.e. the angling and sailing sectors). Of the sectors considered within this report, tourism is likely to be one of the most financially important sectors.

- **Sea recreation** - The contribution of this sector is of medium to high importance to the economy of the Irish sea, however, unlike the fisheries sector, it is not fully exploited and as such shows great potential for growth.

One of the main conclusions of this work is that information relating specifically to the Irish Sea is extremely limited. A large proportion of the existing information relating to the Irish Sea has been interpreted from the data and statistics gathered during other research. In particular economic and employment statistics were extremely problematic to compile.

There is a need for accurate information to support the Irish Sea Pilot Project, collated at an Irish Sea Level; one of the this report's recommendations is the undertaking of a targeted study specifically looking at the Irish Sea area. This would need and involve a partnership approach and a sign-up of all regulators and holders of data. It may also require the gathering of previously uncollected data.

Table 23. Estimated likely ranking of importance of the different sectors within the Irish sea area. * indicates that significant and appropriate data was not available to allow the contribution to UK GDP to be assessed.

Sector	Level of contribution to UK economy	Contribution to UK GDP (%)
Ports and Shipping	High	*
Ferries	High	*
Tourism	High	*
Sea recreation	Medium - High	*
Oil and Gas	Low - medium	0.14
Sea fisheries	Low - medium	0.003
Renewable energy	Low	0.0009
Mariculture	Low	0.0006
Marine aggregate	Low	0.0002

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Annex 4 Shipping statistics for the Irish Sea

Shipping statistics for the Irish Sea
Irish Sea Shipping Data (Technical Note)

January 2003

Anatec UK Ltd

Report to the Joint Nature Conservation Committee, Peterborough from Anatec UK Limited

1. Introduction

1.1 Background

The Joint Nature Conservation Committee (JNCC) commissioned Anatec UK Limited to supply shipping data sets for the Irish Sea. This report presents information on the area of interest, defines the data sources and summarises the results. The detailed data sets have been provided in MapInfo GIS format.

1.2 Objectives

The objectives of the project were to extract the following information for the Irish Sea:

- Merchant shipping data (routeing, type and size distribution)
- Shipping density within a detailed grid of cells
- Ports
- Port Limits (major ports)
- Marinas
- RNLI stations

1.3 Abbreviations

The following abbreviations have been used in this report:

DWT	-	Dead Weight Tonnage
GIS	-	Geographical Information System
JNCC	-	Joint Nature Conservation Committee
km	-	Kilometre
LMIU	-	Lloyd’s Marine Intelligence Unit
MEHRA	-	Marine Environmental High Risk Area
nm	-	Nautical Miles (approx. 1,852m)
RNLI	-	Royal National Lifeboat Institution

2. Study area

2.1 Irish Sea

An overview of the Irish Sea Pilot area of interest is presented below [as Map 1 in this report].

2.2 Grid of Cells

A grid of cells was created for estimating the shipping density within the Irish Sea Pilot area, as shown in Figure 2. Each cell size is approximately 2nm x 2nm. Cells containing land were excluded from the grid. This gave a total of 4,184 cells within the grid.

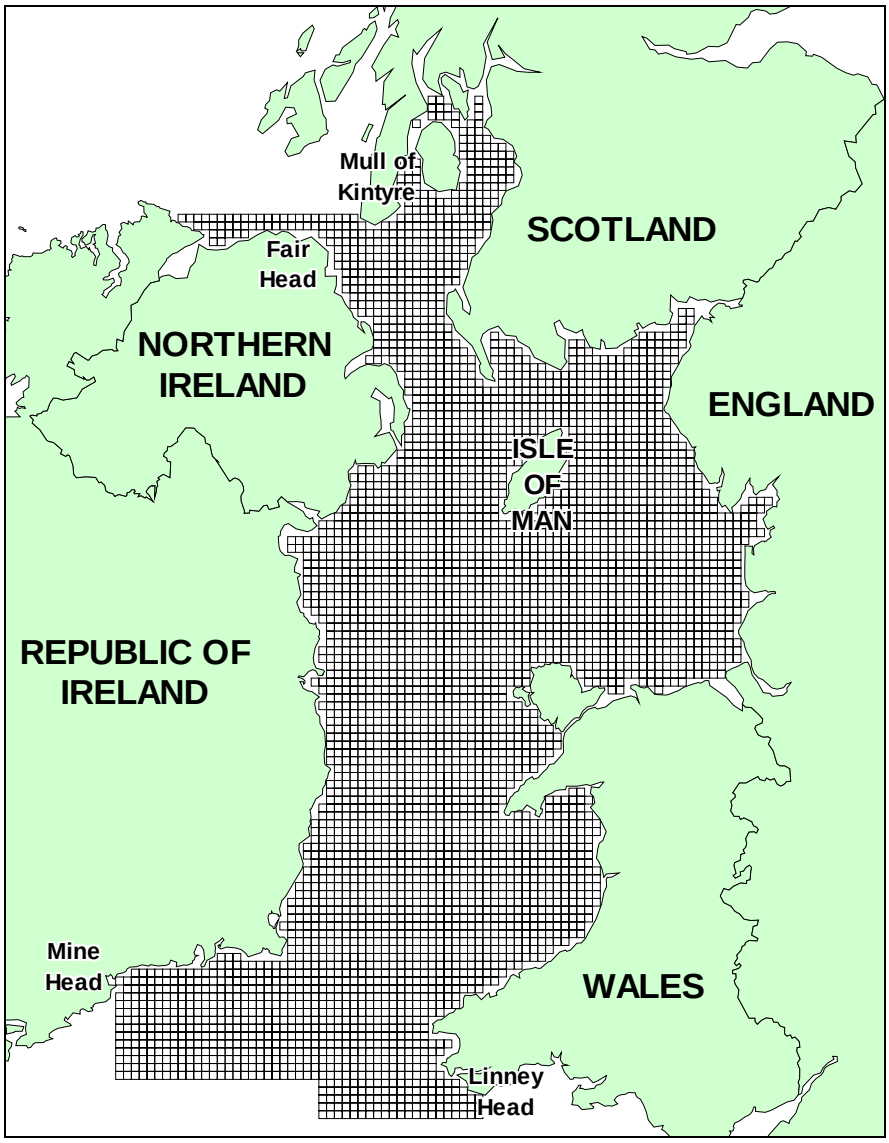

Figure 1 Grid of Cells covering Irish Sea Pilot Area

3. Merchant Shipping Data

3.1 Introduction

This section presents the shipping data for the Irish Sea. The data has been extracted from Anatec's ShipRoutes database, which is described in the next section.

3.2 Overview of ShipRoutes

ShipRoutes is a shipping route database developed by Anatec UK to assist in identifying shipping passing in proximity to proposed offshore developments such as oil & gas sites, wind farms and dredging areas. The database was developed in two main phases:

- **Movements Analysis:**

  The number of movements per year on routes passing through UK waters was estimated by analysing ship callings data at ports in the UK and Western Europe obtained from Lloyd's Marine Intelligence Unit (LMIU) for 2001/02 (ships greater than 100 tonnes). This includes full details on the vessel characteristics, including type and size. For passenger ferry and offshore support vessel movements, LMIU was found to be incomplete, therefore, supplementary information was obtained directly from Operators.

- **Routeing Analysis:**

  The routes taken by ships between ports was obtained from several data sources, including:

  - Offshore installation, standby vessel and shore-based survey data.
  - Passage plans obtained from Ship Operators.
  - Consultation with ports and pilots.
  - Admiralty charts and publications.

This information was combined to create the ShipRoutes database containing all the shipping routes passing through UK waters, with each route having a detailed distribution of shipping characteristics.

3.3 Ship Categorisation

In addition to identifying the annual number of ships per route per year, the distribution of ships by type and size was required in the following categories:

Table 1 Ship Type and Size Categories

(a) SHIP TYPE

Type Code	Vessel Type
T1	Cargo
T2	Tanker
T3	Ferry
T4	Offshore

(b) SHIP SIZE

Size Code	DWT
S1	< 1,500
S2	1,500-5,000
S3	5,000-15,000
S4	15,000-40,000
S5	≥ 40,000

It is noted that LMIU do not have comprehensive data for passenger ferries, which represent a major proportion of the shipping within the Irish Sea. Therefore, this information was researched independently based on up-to-date timetables of ferry operators, such as P&O Irish Sea, Steam Packet Company, etc.

Other vessel types not covered by LMIU include fishing vessels, recreational craft and naval vessels. The movements of these vessels tend to be "non-routine" and therefore they have been excluded from this study.

3.4 Shipping Routes

All the shipping routes in ShipRoutes intersecting the study area have been extracted and provided to JNCC in MapInfo GIS format.

There were a total of 665 routes trafficked by an estimated 86,638 ships per year (an average of 237 ships per day). A plot of the mean route positions is presented in Figure 2. It is noted that in estuaries such as the Clyde, the route positions generally begin and terminate at a common point in the mouth of the Estuary rather than the individual ports within the Estuary.

The overall distribution of shipping passing through the study area by ship type and size is presented in the figures below.

Figure 2 **Mean Shipping Route Positions passing through Study Area** [not included]

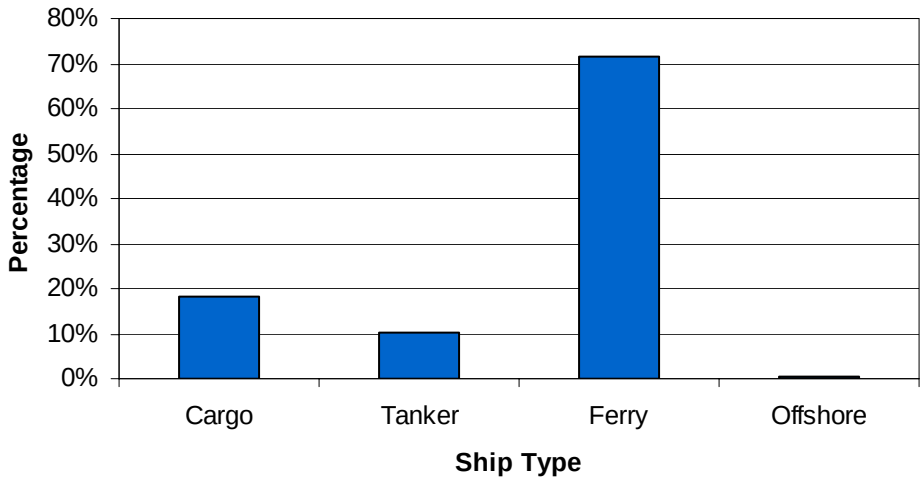

Figure 3 **Overall Distribution of Ships by Type**

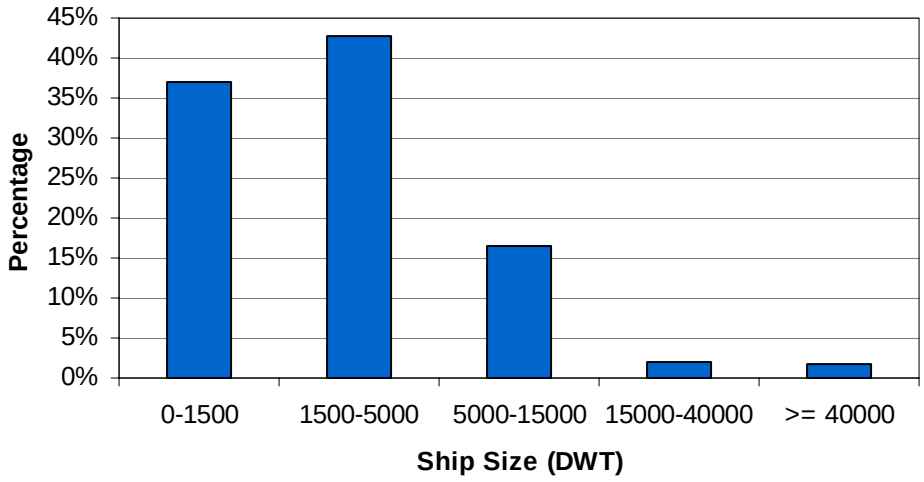

Figure 4 **Overall Distribution of Ships by Size**

3.5 Shipping Density

The density of shipping passing through each cell within the grid (see Figure 1) was estimated using the ShipRoutes database and Anatec's COLLRISK shipping density model.

This section presents the calculation methodology and the results in terms of overall shipping densities (all ship types), and separate maps by combinations of type and size.

The number of vessels passing through each cell is calculated by using the distribution algorithm for the shipping around a route mean position. The standard equation is as follows:

$$f(x) = \frac{1}{\sqrt{2\pi\sigma}} \exp\left[-\frac{1}{2}\left(\frac{x-\mu}{\sigma} \right)^2 \right]$$

where $(x-\mu)$ = distance from the route mean position to the cell
σ = route standard deviation

Using this equation Anatec's model calculates the geometrical target area for each of the routes, giving account to the cell size, cell position, route centre-line and route width, as illustrated in Figure 5.

This assessment is performed for each of the routes passing in proximity to the cell and the number of ships intersecting with the cell is determined. These are summed to provide the total number of vessels passing through the cell per day.

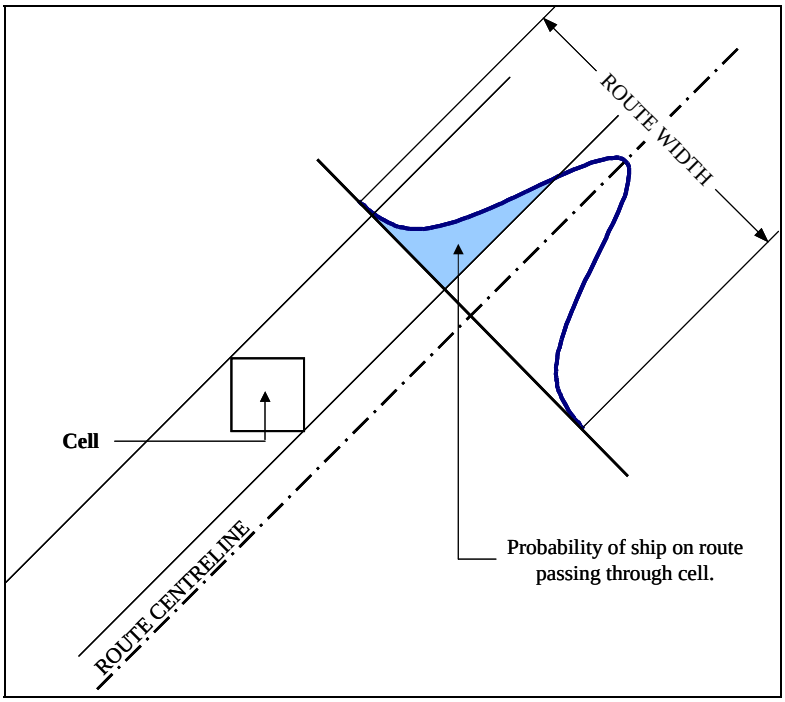

Figure 5 Illustration of Shipping Density Calculation per Cell

Density Results

A colour-coded plot of the average shipping density per cell per year in the study area (all ship types/sizes) is presented below.

Figure 6 **Total Merchant Shipping Density in Irish Sea (All Types/Sizes)** [not included]

Example density maps are shown below to illustrate the geographical variation of different ship types and sizes.

Figure 7 **Ferry Shipping Density in Irish Sea** [not included]

Figure 8 **Large Vessel Shipping Density in Irish Sea (≥ 40,000 DWT)** [not included]

4. Ports

4.1 Introduction

This section presents details on all ports within the study area as well as the port limits of the major ports identified within the Irish Sea.

4.2 Port Locations

The port locations in the Irish Sea are presented in the figure below. The port co-ordinates are based on LMIU data (Ref. [i]).

Figure 9 **Port Locations in Irish Sea** [not included]

A total of 128 ports were identified in the JNCC study area. The Irish Sea port data set has been provided to JNCC in MapInfo GIS format.

4.3 Major Port Limits

The port limits of the following major ports in the Irish Sea were obtained from Admiralty Charts:

- Belfast
- Liverpool
- Milford Haven

The port limits are illustrated in Figure 10.

Figure 10 **Major Port Limits** [not included]

The Irish Sea port limits data set has been provided to JNCC in MapInfo GIS format.

5. Marinas

The locations of UK marinas in the JNCC Irish Sea Pilot study area are presented in Figure 11 (Ref. [ii]). Marinas are defined as pontoons, quays or river berths where it is possible to walk ashore in all states of tides.

29 marinas were identified within the area. The total number of berths in these marinas was estimated to be 6,758. Data was not available for the Republic of Ireland or the Isle of Man.

Figure 11 **UK Marina Locations in Irish Sea** [not included]

The Irish Sea marina data set has been provided to JNCC in MapInfo GIS format.

6. RNLI Stations

The locations of UK and Ireland RNLI stations within the JNCC Irish Sea study area are presented in Figure 11. 70 stations have been identified (Ref. [iii]).

Figure 12 RNLI Station Locations in Irish Sea [not included]

The Irish Sea RNLI data set has been provided to JNCC in MapInfo GIS format.

7. References

[i] LMIU, Lloyd's Ports of the World, 2002.

[ii] RYA Marina Guide, 2000.

[iii] RNLI, 2002.