Coast Map News

Managing marine and coastal data and information

Issue 5/Winter 2004

MIDA - A web portal to coastal and marine information in Ireland

Currently in Ireland, there is no single source where people searching for coastal and marine information can go to visualise and identify datasets of interest and determine where to acquire them. The Marine Irish Digital Atlas (MIDA) project, carried out at the Coastal and Marine Resources Centre in University College Cork, aims to revolutionise access to marine and coastal data and information for Ireland.

The MIDA Project is using the latest in open source web-enabled mapping technologies to bring GIS data and information on Ireland's coastal and marine resources to a growing on-line audience. The key objective of the project is to develop an Irish digital marine web portal, which will be both a repository for geospatial data and an information tool that will appeal to a wide audience, including marine scientists and administrators, those involved in education, and the general public.

Geospatial datasets from numerous organisations across Ireland and Britain will be collected for display in the atlas. Data, text and multimedia elements related to resources and activities in coastal and marine areas will be incorporated into the atlas to make it useful for anyone interested in the Irish coast. It is imperative that the atlas provides technical data and resources to experts, while also being a source of general information which can improve awareness of coastal issues for the general public.

Prototype Development

Development of a demonstration system is nearing completion, and the first version of the atlas is expected to go live on the Internet in the autumn of 2004 (see Figure 1). The core of the system is formed by the open source web-enabled mapping programme MapServer, which allows the user to select, view, and query multiple layers of geospatial information. Note that

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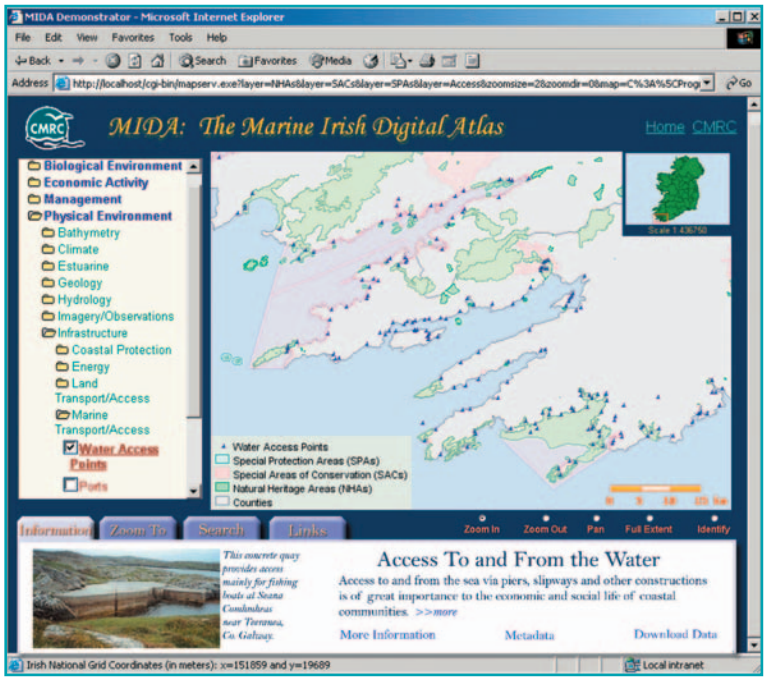

Figure 1. Main prototype atlas page. This prototype is in its early stages of development, but displays some of the basic functionality that the atlas will have

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the layer list is expandable and the information frame is a dominant feature that provides descriptive information about selected layers. A significant amount of the atlas functionality is accessed via this and the other tabbed windows below the map frame.

Atlas Data Categories

Spatially-referenced data is the main constituent of the data repository, consisting of raster and vector layers displayed in the Irish National Grid System. Data collected for the MIDA will cover a wide range of topics related to the Irish coastal and inshore marine areas, including subjects such as archaeology, mammal distribution, tourism, ports, and marine sediments, to name but a few. The categorisation implemented in the MIDA is hierarchical, with four main categories: Management, Physical Environment, Biological Environment, and Economic Activity, as can be seen in the expandable layer list of Figure 1. The hierarchy attempts to group similar entities into meaningful sub-categories so that the data and information can be quickly and easily navigated. The hierarchical data structure will facilitate the addition of data layers as they become available without impacting the overall structure, so the atlas can be easily expanded.

Metadata

Metadata forms an integral part of the MIDA by documenting each dataset held in the atlas in a consistent way. It will provide valuable information such as data quality and who atlas users should contact if they wish to acquire a dataset. ISO 19115 was selected as the metadata standard, because it is becoming the most widely used both nationally and internationally and will facilitate metadata sharing and harmonisation. The atlas contains three levels of metadata: abstract level, which provides a brief summary of the dataset; discovery level, which consists of core metadata elements and serves as the central MIDA metadata database; and full level which is supplied by data owners. The 55 discovery metadata elements are stored in an XML database which will be fully searchable, while the full metadata, where available, is displayed in its native format as the data owner provides it. Hyperlinks within the atlas allow users to move easily between the different metadata levels.

Informational Resources

Fundamental to the atlas are informational materials on each data layer. The aim is to give the audience an understanding of the environment, research areas, resources, and management issues regarding Irish coastal regions. This material is presented as text, image, video and other multimedia elements with links to external resources, and can be accessed by selecting a layer within the atlas. An example is shown in Figure 2. As well as data collection, an important task for the project team will be to distill relevant information by editing text and selecting appropriate imagery to provide informative material that is of interest and understandable to all users.

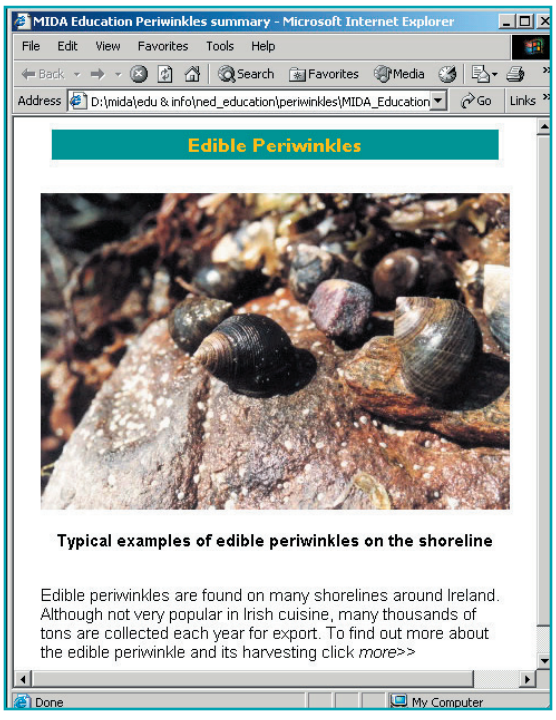


Figure 2. Example of informational materials presented using text and images

Challenges and Objectives

The MIDA project faces a number of challenges, including those related to the sourcing and acquisition of data, data processing, acquisition and handling of metadata, as well as data ownership, cost and licencing issues.

The MIDA has several objectives:

- To meet professional user needs, including easily locating quality datasets and resources, as well as general public needs, such as learning about the coastal environment in their community.
- To encourage data sharing among professionals in the coastal and marine sector.
- To bring together resources so that organisations can see what data exists, where data quality should be improved, and where there are data gaps.
- To raise MIDA's profile so that the atlas is identified as the primary resource for information on Ireland's coastal and marine environment.

The MIDA Project is well on its way to developing a tool that can begin to meet the needs of the Irish coastal and marine community as well as general users. Its success ultimately lies in the cooperation and feedback from data owners and users. This is necessary for the MIDA to become the best source for coastal and marine data and information in Ireland available on the Internet.

Acknowledgements

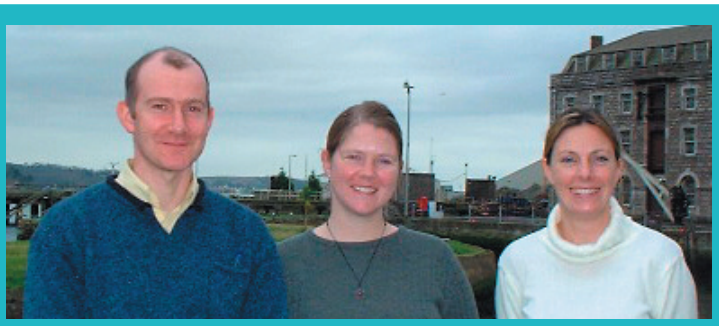
This work is funded for the period September 2002 – August 2005 by the Higher Education Authority (HEA) of Ireland under the PRTLI 3 Programme as part of the National Development Plan 2002 – 2006.

You Too Can Participate in the MIDA

If you or your organisation has information or data regarding the coastal and marine areas around Ireland, we would be delighted to hear from you.

You can publicise your holdings to a wide audience via our atlas by providing us with example geospatial datasets, metadata, links, or any other information which you would like to make publicly available.

To contact us, find out more about the project and to keep up to date with progress, check out our web site: http://mida.ucc.ie



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Welcome to the fifth issue of CoastMap News

Welcome to the fifth issue of CoastMap News. First of all, we are sad to say goodbye to Frances Franklin who is retiring from CEFAS after 36 years at the Burnham laboratory.

Frances started working at the lab as an assistant scientific officer in the chemistry department in 1968, involved with metals and pesticides analysis. She then moved into toxicology and was responsible for the testing of chemicals, particularly oil dispersants, before becoming a member of the Regulatory Assessments Team. In providing advice to Defra for FEPA (Food and Environmental Protection Act, 1985) licences, many types of geospatial data are collated from wide-ranging sources, and it was in trying to access these data that her interest in data management issues began.

Frances organised a workshop in 1999 to highlight the inadequacies in the availability of, and access to, marine information in the UK. An important follow-up workshop was organised in 2002, which attracted key individuals from across the national and international marine community, and defined a number of action points which are now being taken forward. Frances has been instrumental in trying to raise the profile of marine data issues and promote the need for a unified national marine and coastal information resource, and it is very much hoped that significant progress will be made in this direction by the end of the year.

Frances will be pursuing her artistic interests in music, mosaics and stone carving, and I'm sure you will join me in wishing Frances all the very best for a happy and creative retirement.

I am now taking over as editor of CoastMap News, and look forward to carrying on Frances' work in maintaining the profile of marine data issues and highlighting new developments. The focus in this issue is on some of the recent projects being done at the local level, in addition to describing major ongoing initiatives such as the Marine Irish Digital Atlas, and the Defra-led MAGIC (Multi-Agency Geographic Information for the Countryside) project.

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Contents

A Marine Habitat and Resource Management Atlas for the Eastern English Channel

Working under an EU INTERREG III programme, a cross-channel working group has recently started on the development of a Channel Habitat Atlas for Marine Resource Management (CHARM). The work is being undertaken by several partners, including on the French side the Universite du Littoral, IFREMER, the Universite de Lille and the CNRS), and on the English side the University of Kent (Departments of Computing and of Anthropology), plus Canterbury Christ Church University College. These institutions are being supported by CEFAS and by a local Steering Committee made up of parties interested in the marine environment of the Eastern English Channel.

The rationale for the atlas arises from the fact that the Dover Strait and surrounding waters constitute a significant economic resource for a wide range of human activities including tourism and recreation, ports and shipping plus the extraction of biotic and abiotic resources. In addition, the area supports a number of important marine biological features such as:

- A unique marine biological assemblage at the transition between the North Sea (Boreal) and English Channel (Lousitanian) waters,
- Important spawning and nursery habitats for key commercial species such as sole, plaice and whiting,
- Unique coastal and marine habitats such as the Thanet Coast and the Parc Naturel Regional des Caps et Marais d'Opale.

At the present time the exploitation of these natural and human resources lacks integration. Responsible management, aided by decision making through appropriate information systems, will help ensure the sustainability of the resources and natural systems. So the CHARM project hopes to harmonize information, policies and practice in this busy corner of our continent.

Corinne Martin working on the CHARM project

At the end of the two year project it is anticipated that we will have achieved:

- The acquisition of digital data such that a wide range of maps can be produced covering parameters such as water quality, biological distributions, bottom sediments and bathymetry, licensed aggregate extraction areas, shipping lanes, etc.
- A range of models will have been developed showing the impacts on one variable following the exploitation of another,
- An evaluation of the current policy and legal frameworks in the context of managing the marine ecosystem, plus suggestions for improvements,
- Systems for dissemination of the information gained from the project work.

It is strongly hoped that there can be a second funded phase of the project, and this would primarily be concerned with developing web-based interactivity for all of the data gathered, preferably via the utilization of web-based GIS and other digital communication formats. This would allow for a wide range of stakeholder and public participation. Also during a second phase, a wider range of models will be available and these might constitute a "tool box" to aid decision making and planning in the Dover Strait and adjacent waters. During the whole of the developmental stage of the atlas it is intended that the stakeholder committee will oversee developments, ensuring that the project work will be directed towards priority tasks.

The project has only been underway since the Summer of 2003, so at the present time little material output has emerged. A project web-site has recently been initiated at http://charm.canterbury.ac.uk, with the site aiming initially to disseminate information about CHARM. User interactivity will not commence before late 2005. Much of our work thus far has been given over to identifying data sources, collating data sets and ensuring that they are suitably structured for conversion to unified digital mapping formats. Work is also strongly advanced on developing 'habitat suitability models' for several of the local fish species. We have additionally been engaged in identifying the range of likely 'conflicts' that might occur between the various Channel 'users', and it is clear to all of us working on CHARM that the potential for conflicts are plentiful and are increasing. Thus fisheries (as in many other areas) are in a fairly dire situation, there is a huge demand for more marine aggregate extraction, shipping through the Channel continues to grow and there are discussions and plans for various local wind farm developments. And we must not forget that global warming is giving rise to continual species shifts and to sea level rise, both of which add an additional dimension to local marine problems and challenges. CHARM will certainly be a desirable addition to local information systems.

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Construction work underway at the Scroby Sands windfarm off Great Yarmouth

Since May 2002 a new information resource has been giving people unprecedented access to a wide range of rural and countryside information. MAGIC – Multi-Agency Geographic Information for the Countryside – is an internet-based interactive map available at www.magic.gov.uk that for the first time brings together in one place rural and countryside data from the seven partner organisations.

The partners in the project are the Countryside Agency, English Heritage, English Nature, the Department for Environment, Food and Rural Affairs (Defra), the Environment Agency, the Forestry Commission and the Office of the Deputy Prime Minister. The project was led by Defra, whose Geographic Information Unit were responsible for the technical work required to develop and maintain the facility. Representatives from each of the partners made up the project board to ensure the project incorporated all the business requirements of the partners.

MAGIC has been developed using funds from the Invest to Save Budget (a centralised government budget created to help government departments work together in innovative and more efficient ways) and from Defra. The project was the idea of Andrew Stott from Defra's European Wildlife Division and David Askew who manages the GI Unit. Historically there were difficulties getting consistent information about rural schemes and designations that were administered by different government departments and agencies due to lack of time, the cost involved and technical problems. Ad hoc arrangements were in place between organisations to provide data but it was clear that a more long-term effective solution was required. The Invest to Save Budget, now in its fifth round of project funding, provided the ideal opportunity for starting the process of sharing data because it was not tied to any one department and was supportive of more risky innovative projects. The bid for funds for MAGIC was successful in the second round, giving two years of funding from the Budget from April 2000 to March 2002. Following the outbreak of Foot and Mouth Disease and its impact on staff resources in Defra, funds were carried forward until March 2003.

The main feature of MAGIC is the interactive map, which utilises internet-based Geographic Information Systems (GIS) technology. Users have the choice of opening pre-set maps with datasets, or layers, already selected in 'topics' (groups of related datasets) – for example, the Administrative Areas topic displaying county and government office boundaries among others – or selecting up to ten layers of their own choice to build their own map. Standard GIS tools are available allowing users to zoom, pan and identify areas, or features, with a particular designation. Users can choose to open the map at a national (England) level, or can specify the Government Office region, county or place name they want to view. Larger scale views can be opened by specifying postal districts or grid references. The scale can be changed by using the standard zoom tool, or by specifying it when the map has opened. The interactive map also has a reporting facility where users can generate a list of designations within a specified area.

In addition to the map the website offers a range of supporting information. Organisations supply metadata with their datasets which is included in the Dataset Information section, describing the data held, the quality and accuracy of the data and who is responsible for the information. Metadata is supplied with the dataset and updated regularly. Linked to the dataset information database is the data download facility. The majority of Defra and Countryside Agency datasets can be downloaded directly from the website in one of two formats suitable for use in two of the most widely-used Geographic Information Systems. Where partner organisations have existing data supply methods links are provided to either the appropriate website (for example English Nature's data download facility) or a contact address from which data can be requested.

A variety of help facilities are provided which aim to make use of the interactive map as easy as possible. A training manual with examples can be downloaded and descriptions of all the utilities and options are given in the Online Help. A tutorial and demonstration map takes new users through the basics of opening and interrogating the map. The use of Ordnance Survey data and map references are fully explained for people who are less familiar with Geographic Information Systems.

Other facilities are available on the website that complement the interactive map. Some datasets are too detailed to be viewed at small scales in the interactive map, so a series of national and regional static maps have been developed. This allows users to view and download maps of large or detailed datasets like Scheduled Monuments and Countryside Stewardship Agreements that would otherwise be unavailable.

The project is designed to enable anyone working on rural or countryside policy or management to access up-to-date information on the designations in their area of interest. This includes users as diverse as civil engineering companies, archaeological consultants and energy providers as well as the partners.

While the majority of data available on MAGIC is for rural and countryside designations there are a number of historical classifications included. World Heritage Sites and Scheduled Monuments, for example, can be displayed alongside layers such as Sites of Special Scientific Interest, National Nature Reserves and Community Forests. The scope of MAGIC will be extended in 2004 to include coastal and marine designations as well as data held by partners covering Scotland and Wales. These developments are in response to the demand from users and partners with interests that are not limited to terrestrial rural designations in England.

Other work extending MAGIC's information resource continues alongside the every-day maintenance of the resource. Organisations outside the partnership have already supplied data to the project, such as the RSPB and Woodland Trust, and links have recently been established with the National Trust. As well as increasing the amount of data held, MAGIC is keen to expand the supporting information available to users. By providing links to more detailed information about the designations MAGIC is becoming a true 'one-stop shop' for rural and countryside information. For example, users can link directly to the citations for Sites of Special Scientific Interest on English Nature's website after identifying a site on the interactive map. A similar link has been provided from Important Bird Areas to Birdlife International's website where descriptions of each IBA are held. Each of these links gives a more detailed description of the individual sites, increasing the amount and quality of information available to users.

The success of the project has been formally acknowledged by industry.

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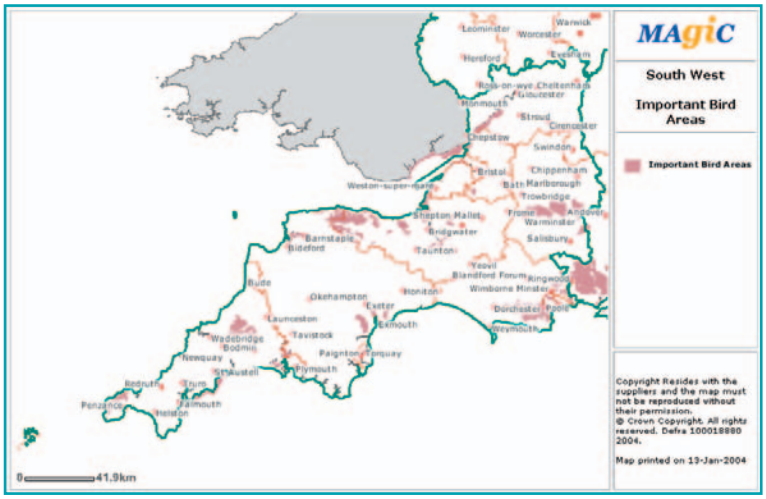

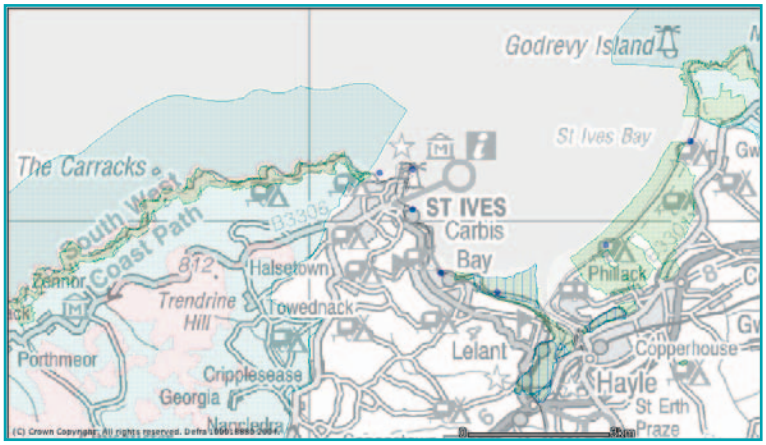

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At receptions held in November and December 2002 MAGIC received the Central Government Project Award from the Association of Geographic Information (AGI), and won the GIS category of the Information Management Awards 2002 (IM2002). The awards are recognition of excellence and innovation in business information management and present an ideal opportunity for organisations to be acknowledged as leaders in their field. They reflect the effort put into the project by the partners, the project board and team and everyone else who has given time and support.

MAGIC Project Team

The project is managed by Ruth Matthews who is based in the Defra GI Unit, and is overseen by a steering group made up of representatives from each of the partner organisations. The project team is drawn mainly from the Defra GI Unit and they have developed the technical aspects of the interactive map and its supporting information and facilities.

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Using G.I.S. to describe fishing activity within the Sussex Sea Fisheries Committee District

SUSSEX SEA FISHERIES DISTRICT COMMITTEE

Project Outline

The Sussex Sea Fisheries Committee hold a large data set on the spatial and temporal distribution of fishing effort within its District. In 2003 the Committee received 50% grant aid to further develop this dataset and to provide a tool for the provision of fisheries effort data in a format that can be exchanged with other stakeholders. Stakeholders include aggregate license holders, license applicants, their agents (i.e. consultants), government departments such as DEFRA, local authorities, fishermen's representatives and non-governmental organisations. Funding for the project was from the Aggregate Levy Sustainability Fund (ALSF) through The Mineral Industry Sustainable Technology Programme administered by the Mineral Industry Research Organisation.

Methods

During routine sea patrols when fishing vessels are encountered fisheries patrol vessels of the Committee have recorded vessel position, date and fishing methods. By analyzing this data over time a description of fishing activity within the District has been ascertained in a quantitative format. The Committee hold the above described data over a number of years and by inputting this data into a geographical information system (GIS) analysis of the information has been undertaken.

Outputs

'A fishing activity database for the Sussex Sea Fisheries District to facilitate better understanding of resource associated with the extraction of marine aggregates'. The project outcome is delivered in an industry standard G.I.S. format. The tools developed will provide for the long-term future maintenance and development of a GIS system managed by the Sussex SFC.

Workshop

In order to publicise the project and to discuss the application of G.I.S. to Sea Fisheries Committees work, a workshop was held in November 2003. The workshop brought together Sea Fisheries Committees, CEFAS and industry to discuss amongst other topics the utilisation of Committee data sets. The workshop also benefited from grant aid through the ALSF administered by MIST/MIRO.

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Fishermen's maps

The knowledge that coastal fishermen have of the estuarine and marine environment, its habitats and species is unique but mostly ignored. One obvious reason is the lack of formal account or representation of this knowledge.

Background

The Essex Estuaries Initiative[1] sponsored a project to help put fishing grounds on a map of the Greater Thames Estuary 2000. At the northern edge of the Greater Thames estuary, the Harwich Haven Authority (HHA) sponsored a project in 2002 to develop a Fisheries Ecosystem Description and Monitoring Strategy with local fishermen. The HHA has also sponsored the collection of weekly fishermen's logs of species and habitats data that will be analysed soon. The relationship developed with fishermen over the years has made the mapping project presented here possible.

Fishermen's knowledge

The knowledge that fishermen have of the coastal ecosystem has the following important characteristics:

- Precisely referenced in space and time, as even the smallest under-10m fishing boats are equipped with GPS, radar, chart plotter, fish finder and echo sounder;
- Regularly, often-daily, updated throughout the year;
- Multi-dimensional and links the presence and abundance of species to their three-dimensional habitats and environment features;
- Generally lacks standardised coding or archival, even though most fishermen keep precise written logs of their catch.

Map production

Fishermen have defined the Harwich Fisheries Ecosystem as the area that sustains their livelihood. On the map given below, it extends to the entire frame and covers the rivers Stour and Orwell and their estuary at Harwich and the coastal and offshore grounds from Sizewell in the North to Clacton in the south and out to the Inner Gabbard. The map production was done in stages. Information layers were added with coloured pens to the Admiralty chart (through Metoc) and upper (drift) sediment geological map (through British Geological Survey) of the area as backgrounds. The level of information detail and quantity was discussed in depth with six fishermen at a series of meetings. This led to the production of

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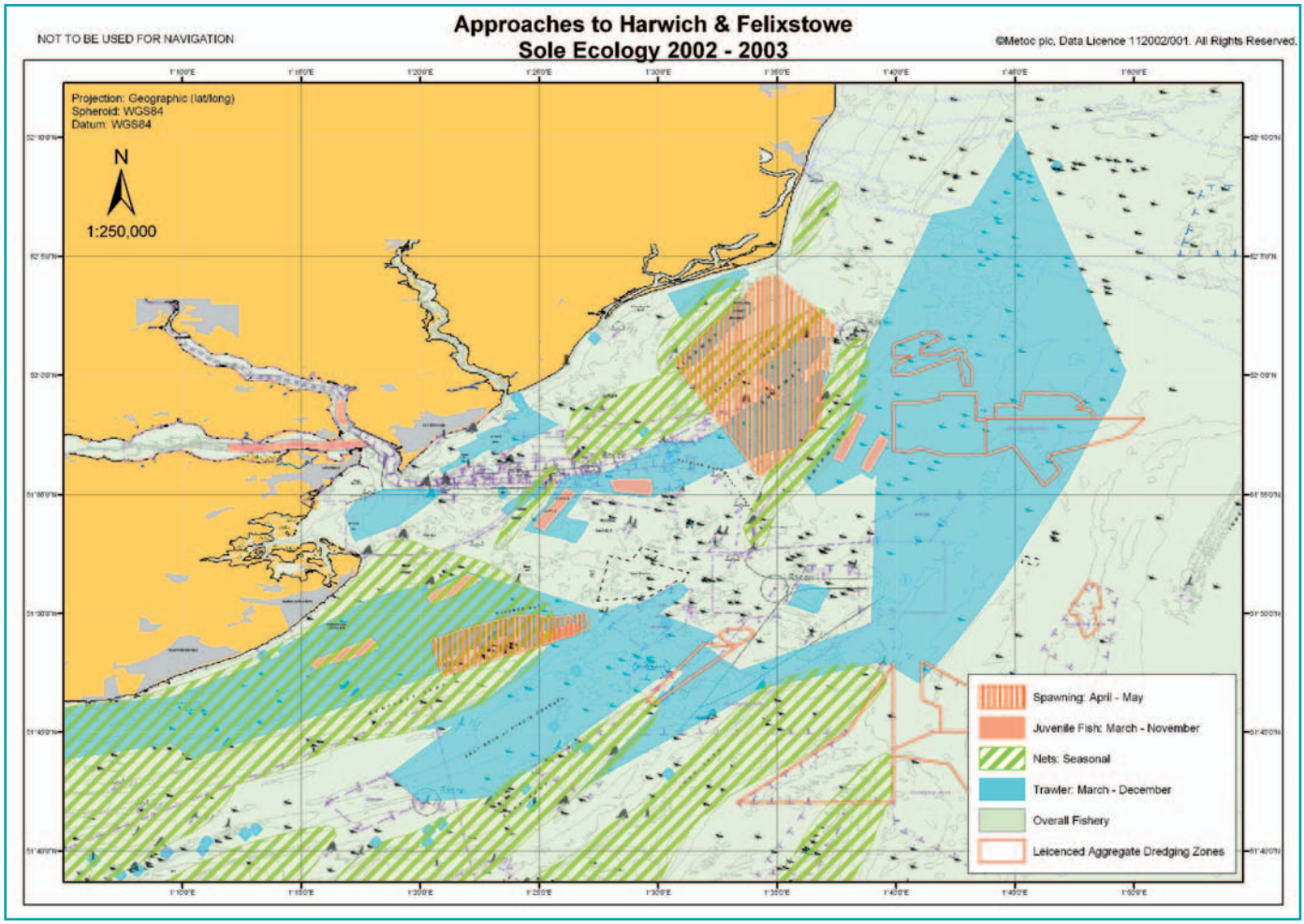

[1] *Report and maps may be downloaded from the Essex Estuaries Initiative website at http://www.essexestuaries.org.uk/about/fameset_plan_greater_thames.htm*

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three thematic maps for the September 2002- August 2003 fishing season, with different degrees of interpretation and synthesis.

The maps locate 1) Fishing grounds for Trawlers, Netters, Long-liners and Potters, 2) Seasonal changes in adult lobster distribution within the ecosystem, and 3) Seasonal distribution of juvenile, adult and spawning Dover soles as shown below.

2002-2003 Dover sole Ecology Map[2]

Dover sole (*Solea solea*) is the single most important species to the livelihood of Harwich fishermen. The Dover Sole Ecology map is the busiest map of the three produced so far. The fishermen have indicated where spawning adult (red stripes) and juvenile (solid brick coloured polygons) soles were found in 2002-2003. They also indicated where netters (oblique green stripe) and trawlers (solid pale blue) caught adult fish seasonally. From their experience over the years, they expect sole to be found seasonally in the entire area (overall fishery, pale grey), but the actual months and areas when the fish are on the grounds vary from one year to the next.

Fishing grounds of the smaller (9-12 m) coastal trawlers based at Harwich (pale blue) are limited to the flatter grounds but not by depth. They caught sole in shallow territorial waters and offshore in depths up to 20 m and 40 m between the Shipwash and the Inner Gabbard to the East of area. South of Harwich, trawling and netting grounds overlap near the coast off Clacton and the Naze, and then alternate with the netters fishing higher or irregular grounds on, and along, the edges of the Gunfleet, Sunk, Long Sand and Kentish Knock sand banks.

Other commercial uses of the seabed

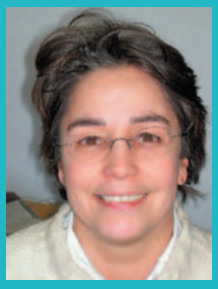
Dover sole are caught on or just off the seabed, and the map also shows a variety of other commercial uses of the ecosystem as indicated on standard Admiralty Charts:

- To the north, submarine cables converge towards the coastal power station at Sizewell (pale blue wavy lines);
- Harwich and Felixstowe harbours are in the middle of the picture to the west, with the deepened (18.5 m) port access channel going out to the East, and deep water (20 m) anchorage areas framed in purple;
- The dredging spoils ground of the Rough Towers (black dashed line polygon) is just south at the end of the port access channel;
- The red line polygons east of 1°30 represent currently active licensed areas for aggregate dredging[3];
- Finally, the Gunfleet Sand[4] offshore wind farm project is not on the map but is likely to appear on it next year.

Not all uses exclude all types of fishing activities all the time, but dumping grounds and medium levels of aggregate dredging intensity do for some years, and this is already visible in some areas of the 2002-2003 map.

What next?

This map is a working document. Both its form and content will be refined in the coming year, and a map for the new season will be produced. As it is, it can already illustrate the unique knowledge that fishermen want to communicate to decision makers and the general public, and it can contribute to inform the licensing of increasing demands on the seabed resources of the fisheries ecosystem.



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[2] *This map was produced by Ian Walker, a student in GIS supervised by Muki Haklay from the Department of Geomatic Engineering at University College London (UCL), as part of his Master Degree (MSc) project.*

[3] *cf. http://www.crownestate.co.uk/cgi-bin/estates/marine/agg/regions-2003.cgi?p=2 and see Coast Map News Issue 4: 10-11 about the Marine Consents and Environment Unit GIS*

[4] *http://www.gunfleetsands.co.uk/ProjectLocationMap.htm*

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