
**Draft report of the Information, Research
and GIS Topic Group**

Moray Firth Partnership

February 1998

Compiled by:

GeoWise Ltd
38 Fowler Terrace
Edinburgh
EH11 1DA

Tel/Fax:0131 228 6249
E-Mail: jmaslen@geowise.demon.co.uk

CONTENTS	Page No.
Executive summary	3
IRGTG group members and contact details	5
Glossary	6
1. Introduction	9
2. Review	11
2.1 Coastal projects and local initiatives	11
2.2 Information sources	12
2.3 Information systems	13
2.4 The SNH Moray Firth GIS	14
2.5 Research	15
3. Issues	17
3.1 Information issues	17
3.2 Information system issues	21
3.3 Coastal management issues	22
4. Opportunities and recommendations	24
4.1 Addressing information issues	24
4.2 Addressing information system issues	26
4.3 Addressing coastal management issues	28
Appendices	
• Appendix 1: Case Studies of Coastal Information Systems: Florida, USA	
• Appendix 2: Generic Datasets relevant to coastal zone management.	
• Appendix 3: Moray Firth Datasets in SNH Moray Firth GIS	
• Appendix 4: Other Information Sources	
• Appendix 5: UK Coastal Initiatives	
• Appendix 6: GIS and related information systems in the Moray	
• Appendix 7: Access to Internet services within Moray Firth organisations and groups	
• Appendix 8: Organisations providing public access to information on the Internet	
• Appendix 9: Common GIS file formats	
• Appendix 10: Existing UK regulations on access to information	
• Appendix 11: Summary of UK Government White Paper - Your Right to Know	
• Appendix 12: Types of coastal geographic information of public interest	
• Appendix 13: Information sharing	
• Appendix 14: Coastal Management Issues related to information systems and research	
• Appendix 15: The resource implications of developing an Internet link and web site	
• Appendix 16: Trends in the Information Society	
• Appendix 17: Useful Internet sites	
References	

EXECUTIVE SUMMARY

Effective coastal management relies upon decision makers having access to appropriate information on the nature and resources of this pressurised region. The needs of these decision-makers vary considerably depending on the organisational context of the decisions and their potential consequences. While the information may have already been collected it may not be in a format in which it can be distributed. Frequently decision-makers also require access to information from multiple sources in a format which allows them to carry out further manipulation. The inherent limitations of paper-based information make it difficult to satisfy such requirements particularly when this information is fragmented within different organisations.

However, there is broad acknowledgement that we are now in an Information Society where the means to meet our demands for information as a raw material are getting ever more sophisticated and personalised. Computerised information systems can provide relevant, accurate and consistent information to the finger-tips of decision-makers. Telecommunications technologies have facilitated this rapid development allowing large amounts of data to be passed rapidly and effectively over large distances effectively re-shaping the concept of space. The challenge is to extract maximum value from existing information sources and develop new sources and information systems which benefit individual citizens, business communities and society as a whole.

Within this wider context of an Information Society individual partners within the Moray Firth Partnership (MFP) are developing their own information systems both to provide staff with more effective tools and, frequently, to improve access to selected information from outwith the organisation. For example, there is a major Central Government initiative called Government On-Line (GOL) which is examining ways of reducing costs and improving service delivery through the effective and innovative use of on-line information technology. These ideas are being put into practice by the Moray Council.

The MFP has now produced a series of issue-specific topic papers reviewing the relevant information available, and listing a range of pertinent issues and opportunities. The majority of these issues have some reliance on information whether it is conveyed through a brochure, through a workshop or through an Internet Web site. In fact the objectives of the Information, Research and GIS Topic Group (IRGTG) reflect many of the wider goals of the MFP itself. The IRGTG is seeking to promote information availability and exchange, potentially through the use of digital information systems, to demonstrate how coastal management issues can be addressed and also encourage a greater public awareness of issues.

This underlying concept of effective information dissemination to those to whom it will benefit is, in practical terms within the MFP, a never-ending task and clearly there is a need to target specific information on the one hand, or specific issues on the other. The IRGTG proposes that consideration is given to the establishment of an Information Management Strategy which would formalise many of the ideas put forward in this paper. This would provide a framework within which an issue-driven approach could be adopted whereby particular issues are targeted based on their value, the benefits they would achieve, and on the information and resources necessary to undertake them.

In practice, there is unlikely to be a standard method for addressing issues although guidelines could be put forward to include an assessment of the following:

- current situation
- key players and decision-makers
- resources required including information
- appropriate methods to achieve objective
- likely impact(s) of change
- indicators of success

In many cases the expertise of specialists will be required whether they be resource management experts, PR/marketing consultants, geographic information specialists or Information Technology

professionals. Very often a combination of skills will be necessary. However, the MFP is in a good position to be able to call on a wide range of expertise through contributions in-kind.

In view of its cross-issue applicability, the IRGTG overwhelmingly supports the development of a MFP Internet based Web site. This would provide the means to address many of the issues related to increasing the awareness of information internally for partners and also externally for interested citizens. For example, the lack of awareness regarding information sources was identified as a major limiting factor in information exchange and the Web site would also be an ideal medium in which to publish a database of 'who hold what information around the Moray Firth and in what format'. The IRGTG also supports a much wider use of the Internet for e-mail as the communication 'backbone' within the partnership and the potential to use the MFP as a vehicle for encouraging partners who are not yet 'on-line' to get connected.

Other coastal management issues require considerable amounts of relatively complex information, derived from different sources, and assimilated within a single system for management and/or analysis. Often these issues are on a Firth-wide scale. For example, information management is critical for an issue such as identifying and monitoring facilities for visitors on the coast (p.5 Sport & Recreation Topic Paper) or coastal defence works (p.25 Geomorphology & Coastal Defence Topic Paper). In contrast, information analysis is critical to resolve areas of conflict between recreational uses and wildlife which can be achieved through zoning approaches (p.8 Sport & Recreation Topic Paper). In both cases, the IRGTG supports an approach based on the exchange of relevant datasets between partners and the use of partners own geographic information systems (GIS) to address such issues. It recommends that the MFP Management Group recognise the need to encourage partners with a direct interest in specific issues to lead in Firth-wide initiatives through more formal agreements.

There are a great range of non-digital means of conveying information and the IRGTG support all measures such as booklets, posters, questionnaires, reports and conferences which are appropriate to the audience they are intended for and provide an effective use of resources. Where possible, there should be a means of evaluating their success in terms, for example, of number of people to which a booklet has been distributed. Professional advice from PR/Marketing consultants would be useful in terms of putting together a more formal communication plan incorporating a range of dissemination methods for one or many coastal management issues.

IRGTG GROUP MEMBERS AND CONTACT DETAILS

Group member	Title	Contact Address	Tel/Fax/E-mail
Gordon Munn	Technician, Development Services Section	The Moray Council Dept. of Economic Development & Planning Council Office High St, Elgin Moray IV30 1BX	Tel: 01343 563301 Fax: 01343 563335 munng@edp.moray.gov.uk
Sophie Vanden Aynde/ Alex Stewart	Engineer, Operation Support	NOSWA Torridon House Beechwood Business Park Inverness	Tel: 01463 228143 No e-mail
Jenny Crawford	Planner	Highland Council Planning Service Glenurquhart Rd Inverness IV3 5NX	Tel: 01463 702279 Fax: 01463 702298 jenny_crawford@highland.gov.uk
Jon Shepherd	Map Manager	Highland Council Planning Service Glenurquhart Rd Inverness IV3 5NX	Tel: 01463 702273 Fax: 01463 702298 jon_shepherd@highland.gov.uk
Paul Griffiths/ Tom Inglis		SEPA North Region Graesser House Fodderty Way Dingwall Business Pk Dingwall IV15 9XB	pgriffiths@sepa.org.uk
Archie Prentice/ Jonathan Clarke		HIE	a.prentice@hient.co.uk - this is incorrect! ??? Fax: 01463 244351
Rachel Harding-Hill	Secretary	The Moray Firth Partnership 27 Ardconnel Terrace Inverness IV2 3AE	Tel: 01463 712221 Fax: 01463 712675 No e-mail
Paul Thompson		Lighthouse Research Station Aberdeen University	???
Delia Marriott (Edin)/ Pam Chambers (Invrns)	GIS Manager/IS Support	SNH 12 Hope Terrace Edinburgh	Tel: 0131 447 4784 Fax: 0131 446 2277 No e-mail
Gillian Dick		Aberdeenshire Council The Town House Low Street Banff BB45 1AY	Tel: 01261 813215 Fax: ??? 100074.3607@compuserve.com
David Green	Lecturer	University of Aberdeen Dept. of Geography Elphistone Rd Aberdeen AB24 3UF	Tel: 01224 272324 Fax: 01224 272331 d.r.green@aberdeeen.ac.uk
Simon Greenstreet	Senior Scientific Officer, Fish Biology Section	FRS Marine Lab Victoria Rd Aberdeen AB11 9DB	Tel: 01224 295417 Fax: 01224 295511 greenstreet@marlab.ac.uk

GLOSSARY

ActiveX:

Microsoft branded software based on the Common Object Model (COM) that manages dialogue between software objects.

Client/Server Architecture:

A computer application which is split into parts that are executed in different places. A client accesses services at a server by sending a request and receiving a response. Client computers, commonly PCs, tend to be those on users desktops while servers are usually dedicated machines which run the networking operating system that services the clients.

E-Mail:

Main service on the internet and is basically a means of transferring ASCII based text electronically. Other types of files can be sent as 'attachments'. It is a fast, cheap and relatively reliable way of sending documents world-wide.

Geographic information:

Information that can be related to a particular location (defined in terms of points, area or volume) on the Earth, particularly information on natural phenomena, cultural and human resources. Geographic/geospatial information could be referenced by grid reference, latitude and longitude, address, post code, electoral district or even country.

Geographic Information System (GIS):

Simply, they can be described as graphical databases. Critically, the advantage that GIS has over non-graphical databases is in their ability to integrate a diverse range of information through a single common attribute, that of geographic space. It has been estimated, for example, that at least 80% of all information collected by a local authority has some form of spatial reference such as a grid reference or postcode. This information can then be input into the GIS where it can be combined with datasets from other sources such as satellite imagery. GIS provide a range of analytical and visualisation functions to manipulate and display the information either as maps, reports or graphical charts.

Information System (IS):

A system which assembles, stores, processes and delivers information relevant to an organisation in such a way that the information is accessible and useful to those who wish to use it, including managers, staff, clients and citizens. An information system is a human activity system which may or may not involve the use of computer systems (Buckingham et al 1987).

Integrated Coastal Zone Management (ICZM):

“ICZM provides a mechanism for the integration of human activities within a zone defined by natural processes which facilitates the sustained use and exploitation of the resources without degrading the environment” (Doody 1995).

Internet:

Initially set up in the 1970s as a military communications network designed to withstand nuclear attack, it is now a global network with an estimated 30 million users on-line with the number growing by 10% per month. It is made up of various tools and services including electronic mail, newsgroups allowing interactive discussions, file transfer utilities such as FTP, gopher and archie, the Internet Relay Chat system for instant message exchange, and the Telnet utility allowing users to login to remote computers. The World Wide Web is simply another service on the Internet.

Internet Service Provider (ISP):

Company which provides third-party access to the Internet. Currently approximately 250 ISPs in the UK offering this type of service.

Intranet:

Web software such as Netscape or Microsoft Explorer, originally created to browse data on the Internet, is increasingly being used internally within companies to publish information for shared use such as personnel guidance, company handbooks, administrative notices and newsletters. Effectively, an information system which 'looks and feels' like the WWW is privately available within an organisation using its internal network.

ISDN:

The Integrated Services Digital Network is an end-to-end dial-up digital network. BT rental charges start at approximately £400 per year although performance speeds are approximately twice as fast as those networks relying on analogue transmission methods.

Java:

Object-oriented programming language recently introduced by Sun Microsystems. Its rapid growth in popularity is largely due to the platform-independent nature of applications written in this language. It has become a standard for developing Internet transportable applications and enhancing WWW browser software through small programs called 'applets'.

Metadata:

'Information about information' such as who collected the data, how it was collected, for what purpose and to what level of accuracy. This type of information is essential to allow a potential user to assess its 'suitability for use'. It should be held explicitly, preferably in a standard format reflecting the level of detail which potential users may require. Considerable efforts are being made in North America and Europe to define appropriate metadata standards particularly for organisations which have a role as information clearinghouses.

Modem:

The device that links the computer to the phone network converting the digital signals produced by the computer into analogue whistles to send down the phoneline and visa versa. They come in different speeds, measured in baud-rates, the higher the baud-rate the faster the modem. Anyone purchasing a new modem should opt for a minimum of 33.6 kbps.

Newsgroups:

Either as 'Usenet' or a 'mailing list' these act as global bulletin boards where participants are able to 'post' items which are then available for others to read and respond to. There are many thousands of newsgroups covering a great range of issues and interests. Users tend to subscribe to lists of interest with subscriptions being free.

Networks:

A network consists of two or more computers linked together by a cable. By running network software on each machine, they are able to communicate with each other. Networked computers mean that users can share peripherals such as printers as if they were connected to their own PC. They have common access to files or a company database. Through e-mail, users can communicate with each other electronically.

Uniform Resource Locators (URLs):

Web site addresses are known as URLs. They are based on the same structure as e-mail addresses except that instead of the user id, the letters http://www are normally put before the name of the organisation. The URL uniquely identifies the Web site and its structure is built up from standard elements usually in the form "organisation.type.country code" eg. http://www.ordsvy.gov.uk. The country code part of the URL is often not essential and most American organisations leave it out.

World Wide Web (WWW):

The WWW is essentially a huge database of information made up of interconnected web pages which have been laid out using a simple mark-up language (HTML). A Web page is basically a collection of hyperlinks set within a page of text and graphics and a Web site, a structured collection of pages allowing the user to navigate the pages in a logical manner. Hyperlinks can be graphics or text, the latter usually coloured blue, and allow the user to move on to another part of the document or else another document somewhere else on the Internet. Browsers such as Netscape and Microsoft Internet Explorer provide the means to 'surf' Web sites. Search engines such as 'Yahoo' or 'AltaVista' provide users with the facility to find their topic of interest. The beauty of the WWW is that for a relatively small outlay, multimedia information can be made available to millions of organisations and personal users. The downside of the WWW is that performance, for a number of reasons, can be slow although there are often means of improvement. For example, access speeds are considerably faster before North America wakes up.

1. INTRODUCTION

1.1 The need to adopt a strategic approach to the planning and management of Britain's estuaries has been widely recognised by the Government in its response to the second report from the House of Commons Environment Select Committee on Coastal Zone Protection and Planning (DoE, 1992). This promoted the creation of estuarine management strategies. The response by agencies in Scotland has been to support a number of projects in the Moray, Solway and Forth.

1.2 Managing the Moray Firth in an integrated and sustainable manner relies upon comprehensive knowledge of the resources and uses of the coastal zone. This information must be placed in the hands of decision-makers in a useable form to allow them to address and balance the interests of the range of stakeholders. Unfortunately, this comprehensive information is seldom at the fingertips of those who need it. Frequently it is held by a range of commercial companies, local authorities, government agencies and non-government organisations who collect it for specific purposes and hold it in a range of formats.

1.3 With these information related issues in mind the Information, Research and GIS Topic Group (IRGTG) defined a series of objectives:-

- **Promote information sources and encourage information exchange in co-operation with existing initiatives.**
- **Demonstrate use and value of information systems in collecting, managing, monitoring, analysing and communicating relevant information on coastal zone management.**
- **Encourage the commitment of Partners, using their own information systems, to work together to address Firth-wide coastal management issues relevant to their interest.**
- **Provide a forum for integrating research past, present and future on the Firth.**
- **Encourage a wider public awareness of and participation in coastal issues through information dissemination and exchange.**

1.4 The term 'information' is used in this report in its widest sense to infer a form of communication. It is used universally to describe many different 'levels' of detail such as the content of a book, the registration of the book title and author under an indexed directory and, in turn, the reference of the directory within a listing of libraries. The inherent concept behind 'information' is the idea of dissemination, although very often this is not uni-directional but some form of two-way exchange. What is information dissemination to one person is information collection to another. Information can be seen as a chain linking people or groups together, often treated as the raw material for decision-making, and ultimately producing a highly complex 'information web' within society. This nature means that it is closely associated with concepts of 'decision-making', 'awareness', 'education' and 'research'. There is therefore considerable potential for overlap with all topic groups, particularly those of Education and Interpretation and Involving Communities.

1.5 The issue of information, its availability and dissemination, lie at the heart of many of the broader objectives of the Moray Firth Partnership (MFP). The underlying concept behind almost all of the main aims of the Moray Firth Partnership is the effective dissemination of information to those to whom it will benefit. Far from being specific to the MFP, such concepts are now being discussed by almost all organisations as the means of information collection, management and dissemination increasingly become dominated by the Digital Age. Central Government is supporting the concept of an Information Society where initiatives such as the Government On-Line (GOL) project is examining ways of reducing costs and improving service delivery through the effective and innovative use of on-line information technology. This will replace paper-based operations and improve on-line access to public information. Many partners within the Moray Firth already have projects with similar objectives underway and the concept of community information systems is being widely considered by many UK organisations with interests in public participation.

1.6 While the concept of information provides common ground for many topic groups, there are nevertheless fundamental differences between the Information, Research and GIS Topic Group (IRGTG) and many of the other issue-specific groups. Effectively it is an 'umbrella group' which relies on the other more specialist topic groups to identify pertinent issues. As such, it is appropriate that this group produces its paper towards the end of the reporting period so that many of the issues raised by other topic groups can be addressed in terms of their information implications. The members of the IRGTG are drawn from a broad range of organisations although they are largely information and/or information system specialists and therefore generally do not specialise in any single coastal issue. Instead of seeking to identify issues and opportunities within a specific field of interest, the group has focused on the information, the raw material, on which many of these issues are based and the means by which it can be effectively managed and disseminated.

1.7 Many of the completed topic papers include reviews of information sources specific to that issue and it is not intended to duplicate this work. Within Section 2 - Review, this paper will address those aggregated sources of information which may not have been included, together with related projects and initiatives and also information systems which are being implemented with similar objectives. The other topic papers also contain countless examples of issues where information is not available or where it is held in an inappropriate format. Information related issues such as these are dealt with both generically and in an issue-specific manner in the Section 3 - Issues. Section 4 - Opportunities and Recommendations builds on these issues and proposes a variety of appropriate and practical means by which they can be addressed. The focus of the paper is thus much more that of 'enabling' rather than 'identifying'. As such it represents the first step in actually defining practical methods to address specific issues. In some cases, information dissemination is the primary goal of a particular issue (eg. increasing community awareness) while in others (eg. zoning areas to minimise conflicts) information is the raw material on which to carry out research and assess the situation.

1.8 The MFP Management Group has yet to confirm in organisational and practical terms the most suitable means of tackling these issues and grasping the opportunities. The result is that the structure of this paper varies from that of many of the others by putting forward a more extensive series of opportunities and recommendations. The critical role of information in achieving the overall goals of the MFP suggests that many of these recommendations should be addressed directly at Management Group level.

2. REVIEW

2.1 Coastal projects and local initiatives

2.1.1 At the beginning of this decade integrated coastal planning and management in the UK was in its infancy with only areas such as the Sefton and Northumberland Coasts tackling these issues. Since then, numerous coastal projects, management plans and strategies have been implemented in a move towards sustainable use of our coastline. The coastline has also become more important at national and international levels. The DoE's Coastal Forum is in operation in England and an equivalent has just started in Scotland; the Scottish Coastal Forum. SNH response in Scotland has been the establishment of a series of Firths initiatives based on voluntary partnerships including others in the Forth and Solway, and, to a lesser extent, in the Mint, Clyde and Tay.

2.1.2 A good starting point for initiatives that are in operation is a publication by the National Coasts and Estuaries Advisory Group entitled *Directory of Coastal Planning and Management Initiatives in England*. This directory describes many of the initiatives although is somewhat out of date. The group are hoping to bring out a more up to date version which will include Scotland. A further source of more recent information on national initiatives, particularly the development of Estuary Management Plans in England and Wales, is *Coastal Zone management - Towards Best Practice* (DoE 1996). Appendix 5 details some of the more important initiatives within the UK.

2.1.3 There are also many web sites that are now appearing that describe particular coastal zone management projects. One of the best sites for links to these sites is the Coastal Management Web site (<http://wantree.com.au/~kays/index.html>) which has comprehensive links to web pages of active coastal management programs. The site developed by the Coastnet team (<http://www.poptel.org.uk/iac/coastnetuk/>) also has a set of useful links.

2.1.4 These other initiatives could certainly be an important source of information on Coastal management issues not only in terms of best management practices (BMPs), strategy development and policy making but research being carried out and methods for handling information within partnerships.

2.1.5 For example, research commissioned by The Scottish Office Environment Department resulted in the report 'Accessing Environmental Information in Scotland - A Research Report to the Scottish Office' (1995). The report was based on detailed questionnaire surveys of the six learning contexts identified in Learning for Life, namely households, community organisations, recreation and leisure, schools, colleges/higher education and companies/organisations. The survey was used to assess environmental information requirements specifically their chosen sources of information, their ease of access to information, their use of networking, their optimum formats/media for that information and how they use that information. Some interesting conclusions were derived on the means of information dissemination, namely that newsletters or leaflets (even amongst academics) were by far the most preferred medium except in the Community context where personal contact was preferred.

2.1.6 Local initiatives in the Moray Firth relating to information systems also have a particular relevance to the MFP. The Highland GIS Forum, for example, meets informally every 6 months to demonstrate one of their systems and discuss subjects of mutual benefit such as the ease of data sharing. It is not intended to develop this into a formal body and meetings do not result in a set of action points unless proposals are volunteered. It is composed of the following representatives:-

- Highland Council
- NOSWA
- Forest Authority
- Highlands & Islands Fire Brigade
- Northern Constabulary
- HIE
- SNH
- SEPA
- Crofters' Commission

2.1.7 Likewise, the TITAN project is part of the EC Telematics Programme (DG XIII) and is intended to provide a gateway to integrated services offered by 1 or more of the 4 organisations (HIE, Highlands & Islands Tourist Board, Highland Council and Northern Constabulary). The project is based on the use of Internet technologies to provide personalised information of 'added value', potentially through a map based interface. Further information can be obtained through GeoWise Ltd.

2.2 Information Sources

2.2.1 A vast amount of information is held by the various partners within the Moray Firth and very often this is in paper format and has been poorly documented. In response to recent and forthcoming legislation (see Appendix 11) many organisations are attempting to review and rationalise this information and incorporate it within some form of information system. Perhaps of most value are the sources of 'higher level' information which has been processed in some way eg. directories or bibliographies providing 'pointers' to lower level information in more of a raw state. It is this type of information that this topic paper primarily focuses on.

2.2.2 The Topic papers themselves are valuable sources and many contain issue-specific reviews of information whether it is in terms of organisations with responsibilities or interests in an issue, references to relevant reports or lists of useful datasets. Not only do these topic papers detail information sources but also highlight gaps in information availability (eg. Geomorphology and Coastal Defence Topic Group p27).

2.2.3 These references could be supplemented by the recent audit of information held by SNH, Highlands and Island Enterprise and Highland Council and currently held by the Planning Department of Highland Council. A summarised audit of datasets relevant to the Moray Firth and held within the SNH GIS is also provided in Appendix 3.

2.2.4 The Moray Firth Review (Harding-Hill, 1993), now 5 years since publication, still provides a valuable over-view and starting point for further research. Likewise, another source of up-to-date, generalised information is the Coastal Directory Series by the JNCC for which an edition has been published covering the whole Moray Firth region. This has been developed to produce "extensive baseline environmental information for each part of the UK coastal and nearshore marine zone".

2.2.5 There are also other sources of more generalised digital information on the coast. For example, the UK Digital Marine Atlas Project (UKDMAP) is a PC-based digital atlas and references work on many aspects of the coastline and seas around the British Isles. This was produced by the British Oceanographic Data Service (BODS) and holds over 450 thematic charts. A break down of the information held is given in Appendix 4. Many of these datasets are very coarse; 100 metre bathymetry lines, sea bed sediments at a resolution of 1 km². However, this can be an excellent starting point for access to more detailed information on the coast. The Atlas also holds many geo-referenced catalogues of material related to the marine environment. For example, there are point locations of where information is held on the Marine Nature Conservation Review database (the MNCR is described in Appendix 4).

2.2.6 In addition catalogues of digital information on the coast and seas are beginning to emerge. One of the most comprehensive on marine data is the UK Directory of Marine Environmental Data (UKDMED). This directory was compiled and is maintained by the BODS and is part of a project on the European Directory of Marine Environmental Data (EDMED) (see Appendix 4 for more information on BODS and EDMED). "The aim of the Directory is to provide a comprehensive reference to the marine environmental data sets and collections held by UK laboratories so as to a) give marine scientists, engineers and policy makers the means of identifying sources of data and b) provide essential background information against which appropriate strategies may be developed for managing these data at a national level. The Directory contains descriptions of 570 marine environmental data sets held by 90 groups in the UK encompassing academia, public bodies and private companies. Data sets are catalogued irrespective of their format (e.g. digital databases or files, analogue records, paper charts, hard-copy tabulations, geological and biological samples, etc.) and include data collected from the last century through to the present. They cover a wide range of disciplines including marine meteorology; physical, chemical and biological oceanography; marine biology and fisheries;

environmental quality monitoring; marine geology and geophysics, etc.” (BODS Web site; www.nbi.ac.uk/bodc/bodcmain.html)

2.2.7 Although very few datasets in this catalogue are specifically for the Moray Firth there are many that are of potential value. The catalogue is also an excellent example of how information can be publicised to a wide audience and its exchange encouraged. Both UKMED and EDMED are held as searchable catalogues on the web. Appendix 4 gives an example of the type of information they hold for each dataset.

2.3 Information Systems

2.3.1 Traditional manual methods of storing and retrieving information such as reports, maps and photographs are becoming too clumsy and inefficient. Data integration, necessary before any analysis can be carried out is, at best, difficult while metadata commonly remains locked away in peoples heads. Digital information systems allow large quantities of data in different formats to be integrated, maintained and retrieved rapidly and at lower cost per unit. They have an infinitely superior ability to manipulate, update and analyse data and flexibility to present information in a variety of forms.

2.3.2 Central to many of the coastal information management strategies world-wide has been the use Geographic Information Systems (GIS) which offer the potential, for the first time, to manage such diverse geographical data within a single system. Garcia and Kapetsy (1991) list the advantages of this technology to include:

- Providing a receptacle for scattered data from different sources;
- Improving the visualisation of geographical data for space-use management;
- Improving the understanding of interactions between ocean and land processes in the coastal zone;
- Allowing statistical and spatial analysis, visualisation of models and impact assessment;
- Making better use of remotely sensed data;
- Developing appropriate information management infrastructures; and
- Facilitating the means of information exchange.

2.3.3 There is a rapidly growing catalogue of coastal applications where GIS technology is now being applied. For example, Rickman and Miller (1995) have published a bibliography of 390 references GIS which is currently being fully revised by Darius Bartlett at the University of Cork, Eire. There is also considerable interest within the GIS community demonstrated by the establishment of the Association for Geographic Information (AGI) Special Interest Group on GIS and ICZM and their recent 3 day conference (Aberdeen, August 1997) publicising GIS applications within the coastal zone.

2.3.4 Examples of operational coastal information systems designed to address the many inter-related facets of Integrated Coastal Zone Management (ICZM) remain relatively few in Europe. This may be due to the lack of a suitable organisational setting. In the UK for example, a large estuary may encompass many Local Authorities whose jurisdiction is limited to land above high water mark. Regional and national agencies have traditionally had more specialist statutory or non-statutory responsibilities such as maintaining water quality or nature conservation. Likewise, non-governmental organisations and pressure groups tend to focus on single issues while commercial companies simply do not have sufficiently wide or neutral interests.

2.3.5 In the UK, this organisational context has resulted in a large number of sectoral information systems and a multiplicity of datasets and formats. Examples of more generic coastal applications that are in operational use include the United Kingdom Digital Marine Atlas (UKDMAP) funded by NERC which includes marine and coastal environmental information, a GIS developed for environmental impact assessment by the Disposal at Sea Team, MAFF (Franklin, 1996) and the use of GIS for flood defence and shoreline management by the Environment Agency (McLean & Leggett, 1996).

2.3.6 Examples of true integrated coastal information systems do in Canada and the US. These are often based in federally funded organisations with a statutory remit to manage estuaries in an integrated fashion such as the Fraser River Estuary Management Program or in state agencies such as the Florida Department of Environmental Protection (www.fmri.usf.edu). Appendix 1 details a useful

case study in Florida where the State government is currently combining the management and analysis power of GIS with the dissemination opportunities offered by the world-wide web. In fact, most coastal provinces and states within the US and Canada have developed or are developing some form of coastal resource GIS (Ricketts, 1992). A nation-wide initiative is being funded by the National Oceanic and Atmospheric Administration (NOAA) and state government agencies to compile Environmental Sensitivity Index databases for the whole US coastline using Geographic Information Systems (GIS) to assess their vulnerability to oil pollution. This will result in large amounts of generic information being collected and integrated relating to coastal habitats, biological resources and human-use resources.

2.4 The SNH Moray Firth GIS

2.4.1 Ricketts (1992) states there is an *“urgent need to provide simpler access and data manipulation tools that can be used directly and relatively easily by the resource managers and scientists themselves”*. The SNH Focus on Firths program recognised such a need after publication of the report: 'The Moray Firth Review' (Harding-Hill, 1993). This report brought together, in paper form, a diverse range of datasets for the firth with a view to integrated coastal management. In effect it was a paper-based GIS. Although comprehensive, it lacked flexibility both for analytical operations and updating. Plans were proposed to develop a relatively easy-to-use GIS for the Scottish Firths, namely the Forth, Moray and Solway estuaries. The subsequent report detailing user requirements for a Firths GIS produced a very useful list of generic datasets relevant to coastal zone management (Appendix 2).

2.4.2 The development of a GIS for the Moray Firth was part of this project and began in March 1996 of which the main aim was to design a system to aid SNH area officers in their work around the coast. The system was developed using ArcView, one of the world's most widely used desktop GIS packages. This is a windows based system that gives users access to a range of GIS tools through an easy to use graphical user interface.

2.4.3 Development of the SNH Moray Firth GIS began through the collation of datasets on the using Appendix 2 as a baseline for data prioritisation. A useful initial source of data was from a study carried out by Aberdeen University (Green and Ray 1996) into the Siting of an Artificial Reef within the Moray Firth using GIS techniques. Appendix 3 shows the datasets that have now been collected and are currently available to SNH staff. In addition the system has been customised to meet specific requirements of the users.

2.5 Research

2.5.1 Many of the other topic papers give a bibliography of research relating to their particular fields. There was no knowledge within the IRGTG of a single source for research information such as a directory or bibliography for the Moray Firth as there is for the Forth Estuary. It appears that researchers rely on personal knowledge made through contacts in related fields to determine what other research has been carried out and whether suitable new opportunities exist. The fact there has, until recently, been only one university, Aberdeen, in the region may explain this. This will hopefully change with the growth of the University of the Highlands & Islands.

2.5.2 All the main organisations carrying out research on the Moray Firth are shown in Table 1. Many of these may, of course, commission other specialist organisations, some of which will also be included in the table, to actually carry out the work. There are obviously other national and international organisations carrying out relevant research very sporadically in the locale or those whose work has implications on issues within the Moray Firth.

Table 1 Main organisations carrying out research in the Moray Firth

Universities/Colleges
Aberdeen University - Centre for Remote Sensing & Mapping Science - Lighthouse Field Station
St Andrews University - Institute of Maritime Studies
Dundee University - Centre for Coastal Zone Research
Edinburgh University - Institute of Ecology & Resource Management - Department of Geography
University of Highland & Islands - Environmental Science
University of Hull - Institute of Estuarine Studies
University of Portsmouth - Centre for Coastal Zone Management
University of Glasgow - Department of Mapping & Topographic Science
University of Strathclyde
Scottish Agricultural College
Government departments, public agencies & publicly funded institutes
Scottish Office - SOAEFD inc. Fisheries Research Services-Marine Lab - Development Dept.
Central Government - Dept. of Environment, Transport and Regions
Scottish Environment Protection Agency
Scottish Natural Heritage
Historic Scotland
RCAHMS
JNCC - Seabirds Research Unit - Aberdeen - MNCR
Crown Estate Commission
Scottish Association for Marine Science - Dunstaffnage Marine Lab
Farming and Wildlife Advisory Group
British Geological Survey
Macaulay Land Use Research Institute
Institute of Terrestrial Ecology
Proudman Oceanographic Institute
Sea Mammal Research Unit
Salmon Fisheries Protection Agency
Forestry Authority
NGOs
RSPB
Wildfowl & Wetlands Trust/British Trust for Ornithology

Scottish Wildlife Trust
Commercial organisations
Oil companies (Texaco, Talisman) - Environmental science labs
Hydraulics Research (Wallingford) Ltd
Port Authorities

3. ISSUES

3.1 Information Issues

3.1.1 Developing an Information Management Strategy

3.1.1.1 The DoE report, Coastal Zone Management - Towards Best Practice, proposes that an overall management strategy for handling information should be developed. This should “*..ensure consistent consultation and presentation, accuracy in publicity, good promotion and effective management. It should also avoid duplication of effort..*” (DoE, 96).

3.1.1.2 Such a strategy would overcome the common tendency to collect information for information’s sake particularly where organisational objectives are fairly broad. Information needs should be largely determined by the issues raised in the topic papers. These are listed in Appendix 14. Due to practical resource considerations it will be necessary to prioritise these issues and encourage partners to contribute their expertise in evaluating the respective information and information system requirements. It is the intention that many of these issues could be addressed directly by the information systems proposed in Section 3.2 below.

3.1.1.3 An information strategy could also provide a practical framework for prioritising and addressing coastal management issues. Each issue could be assessed under the following headings:-

- current situation
- key players and decision-makers
- resources required including detailed evaluation of information needs
- appropriate methods to achieve objective
- likely impact(s) of change
- indicators of success

3.1.1.4 In many cases the expertise of specialists will be required at this assessment stage whether they be resource management experts skilled in public participation and conflict resolution, PR/marketing consultants, geographic information specialists or Information Technology professionals. Very often a combination of skills will be necessary. However, the MFP is in an ideal position to be able to call on a wide range of expertise as contributions in-kind from partners.

3.1.1.5 An information strategy should also consider projects and initiatives of a similar nature both within the Moray Firth and also within the UK and EC. Likewise, compatibility with projects being carried out by the partners themselves is crucial and, in terms of advice and/or resources, could prove extremely lucrative.

3.1.2 Information Formats

3.1.2.1 There is a huge range of potential formats and media which can be used to convey information. Identifying the most suitable format(s) to disseminate information within a defined budget can be a complex task and may require professional advice from resource consultants, PR/marketing consultants etc. as has been the case for the Cairngorms Partnership recently. The method(s) largely depends on the resources available, the purpose of the information and the intended audience. The latter is frequently narrowed down through initial market research. The theoretical example below demonstrates how formats may vary due to subtle differences in objectives:-

- **Objective:** An organisation is looking to raise the profile of its work amongst local citizens and communities through providing information to them.
- **Intended audience:** Formal and informal community groups & organisations (eg. community development and educational organisations, local residents groups, faith/ethnic/women's/youth groups) & schools
- **Formats/media:** Newsletters, leaflets, mass media (local radio, local newspapers), personal contact

- **Objective:** An organisation is actively seeking the views of local citizens and communities to its work to add political weight to its objectives.
- **Intended audience:** Formal community groups & organisations (eg. environmental organisations, local enterprise companies), local councillors, 'organised community' (eg. representatives from local government, public agencies etc)
- **Formats/media:** Questionnaire surveys, local meetings, round table groups, citizens' juries, opinion polls etc.

3.1.2.2 Clearly the MFP needs to adopt a multiple methods of information dissemination in order to satisfy its range of objectives. Many councils, for example, have found new ways of consulting the public leading to better, more creative decisions with greater consensus and less conflict (LGMB 1994). A review of some of the information publishing/dissemination methods available is included in Table 2.

Table 2. Information dissemination formats/media

<i>Category</i>	<i>Format/media</i>
Traditional	Personal contact/meetings Letters & memos Telephone/Fax Reports & Papers Newsletters, booklets, leaflets, posters & brochures Notice boards & signs Directories Books & manuals Graphical representations (maps, pictures, photos etc.) Questionnaires & interviews Video and audio cassettes
Mass media	Television (national & local) Radio (national & local) Newspapers & magazines (national & local)
Computer-based Information systems	Files Databases Electronic mail Internet (browsing world-wide web etc)
New technologies	Digital storage media (CDs, disks, tapes etc) Digital interactive TV Digital interactive telephone
Hybrid methods used in community participation projects	
<i>Useful References.:</i>	Focus groups and survey panels One-off or on-going round tables

LGMB 1997	Citizens' juries and panels
LGMB 1996b	One-off conference
LGMB 1994	Deliberative opinion polls
Davis & Edwards 1997	Community fora
Davis 1996	Scoping documents inviting comments
Scottish Office 1995	Visioning exercises
DoE 1996	Appraisals and audits
Tye 1994	Quizzes
Nicholson 1995	'Planning for Real'
Institute of Ecology & Resource Management, Univ. of Edinburgh 1995	Community arts
	Awards
	Information service counters
	Demonstration projects
	Public meetings
	Community Information Systems

3.1.3 Information Sources

3.1.3.1 It is recognised by the IRGTG and confirmed by the Scottish Office Report (1995) that one of the major limitations of getting the appropriate information to the right people is the lack of knowledge of what is available. Currently large amounts of information are available but for a wealth of reasons (see Appendix 13) they have never been made available more widely. There is now increasing responsibilities on many organisations to make much of their information more publicly available (see Summary of White Paper , Your Right to Know - Appendix 11).

3.1.3.2 One way to improve this situation discussed by the IRGTG is to create a digital directory of datasets of use to partners, preferably at a firth-wide scale. This could include a summary of all relevant details regarding a particular dataset and would build on the the recent audit of information held by Highland Council, HIE and SNH. As a database, it would be relatively simple to update and would evolve as more organisations registered details about the datasets they hold. Initially it could focus on raising awareness of the information required to address specific issues. There would be a number of ways information from this database could be disseminated; either directly through a web site, of which there are many similar examples (see www.ordsvy.gov.uk/services/sines/index.html), or published as a booklet.

3.1.4 Information Standards

3.1.4.1 The emerging Information Society based on the need for more open exchange of digital information between individuals at all levels means that information standards are a major area of concern. The large scale adoption of de jure standards such as the use of Microsoft products on PCs has meant that compatibility problems caused by the exchange of digital information are becoming rare. However, information held in digital databases can still pose significant compatibility problems when attempting to transfer it to other systems. Although there are standards emerging in geographic information systems (see Appendix 9 for common GIS exchange formats and Appendix 13 for a review of standards) considerable technical difficulties can still occur depending on the nature of the software package or packages and the structure of the information.

3.1.4.2 There remains considerable benefits in increased standardisation of digital data formats and structures between partners in the Moray Firth. The DoE report (1996) provides guidelines on the benefits of managing baseline datasets (common to many organisations) centrally at a local level by an agreed organisation in order to avoid duplication and ensure consistent formats and standards. More specifically, it would be advisable if agreement could be sought by the majority of organisations around the Firth to hold digital geographic data in GB National Grid projection used for all Ordnance Survey maps (rather than latitude and longitude or other alternatives). The majority of GIS users have implemented ESRI software or SmallWorld (see Appendix 6) so it would also be sensible to define an interchange format which would be compatible with both these systems. Other issue-specific

standards could be defined such as pre-defined coastal zones for carrying out bird counts which all organisations carrying out such work adhered to. Comparative bird count studies would then be more feasible.

3.1.4.3 Currently much work is being carried out at a UK and European level into standards for metadata relating to geographic information such as when and where was the data collected, for what purpose, by whom etc. (see Appendix 13). The lack of standards in the way metadata is held (if at all) is a significant hindrance to effective information exchange, since it is only through knowing this associated information that the data can be 'put to use' effectively. Any development of a metadata directory as described in Section 3.1.3.2 above would require standards to be defined so that datasets originating from different organisations would be consistent in their descriptions.

3.1.5 Copyright and Licensing

3.1.5.1 The almost infinite degree of flexibility that comes with digital information has led to 'grey areas' relating to intellectual property rights and new regulations such as The Copyright and Rights in Databases Regulations 1997. In general access and exchange of information is regulated legally through licence agreements which tend to be bi-lateral between the supplier and the user. Licences for digital information are frequently associated with some sort of financial cost which can preclude access. Some organisations such as Local Authorities have come together to develop Service Level Agreements with organisations like the Ordnance Survey to reduce the costs of their data. However, even environmental data will generally be exchanged through a formal licence agreement. This will very likely restrict its availability to the licensee and a minimal charge is likely to be levied covering the cost of extracting and sending it. There are a large number of legal, financial, and political considerations affecting the exchange of organised information some of which are discussed in more detail in Appendix 13. Many of these concerns are exacerbated within the context of a voluntary partnership organisation where information access to partners is largely undefined and therefore dissemination is potentially limitless.

3.1.6 Information Collection

3.1.6.1 It has been suggested that one role of the MFP could be as an information collector and managers. Other projects such as the Sefton Coast LIFE Project have seen this as one of their main objectives. The topic papers have identified, in some cases, many gaps in existing information (eg. visitor facilities - Sport and Recreation Topic Paper) while in other cases information is available but held in an inappropriate format. Such information could prove extremely valuable to a number of organisations around the firth. There would certainly be considerable scope for the MFP to consider using its resources to commission survey or research work which involved data collection. For example, the use of remote sensing technologies has been applied widely to coastal issues (Raper et al, 1994; Groom, 1996) and there would be ample research opportunities to apply this technology to specific management.

3.1.6.2 If information collection was adopted by the MFP, issues relating to intellectual property rights raised in Section 3.1.5.1 above would have to be considered, particularly if this information was seen to have monetary value.

3.2 Information System Issues

3.2.1 Use of the Internet

3.2.1.1 The Internet comprises of a number of utilities (see definition in Glossary) which allow users to send and receive e-mail, allow information to be published to a selected or unlimited audience, act as an vast information repository, facilitate data exchange and can even provide a medium for group discussion. The level of Internet access within UK households is estimated currently to be at least 5%. In terms of on-line access amongst formal organisations this proportion is significantly higher. These levels are rising at an increasing rate as the technology becomes more accessible and, with the development of digital TV within the next year, households will no longer be restricted to accessing the world-wide web through a computer. The levels of Internet access amongst the IRGTG and organisations currently using the web to disseminate information are given in Appendices 7 and 8.

3.2.1.2 Access to on-line Internet services provides an unique opportunity for the MFP to dramatically improve communication efficiency between partners themselves and also between partners and local communities/citizens. Likewise, it would also allow effective communication at a national and international level, widening the potential audience and increasing awareness of its work. The Internet should be seen as an essential 'information backbone' for the MFP which, by the end of this century, is likely to become the standard for information exchange within most organisations. There are obviously significant cost implications for providing Internet access on a corporate level due to issues such as the need for security measures, although the cost to individuals for on-line access is relatively small. The applicability of the technology is therefore great.

3.2.1.3 For example, organisations such as the Moray Council are using the capability of the web to develop community information systems to meet the needs of local residents, businesses, local community groups and council members. The application uses electronic mail to link 150 remote, rural locations which previously had been serviced by van or fax. One intention is to make the Council's Library catalogue available which will improve the usage of flexible learning packages and avoid items being bought separately by different sections of the authority. It is hoped also to publish a directory listing of all businesses in Moray. Currently the web site is being accessed 30,000 times a month and there are further plans this year to develop a network of public access terminals with Internet and Intranet capability.

3.2.1.4 There are many issues related to the creation of a Web site for the MFP not least deciding its purpose, in particular the audience it is intended for, and consequently its content. The purpose of the site might be one or many of the following: -

- Community Information Service
- Educational use - schools
- Research/academic use
- Partners requirements eg. facilitate information exchange through digital directory
- Promote information of general interest to encourage sustainable use
- Tourism
- Sport and recreation
- MFP administrative use - on-line form for membership
- Linking to partners sites and other project sites

3.2.1.5 One specific example would be to provide the means for citizens to determine who is responsible for particular coastal issues and who accountable for decision-making and policies. This could be provided on an issue-by-issue basis including pollution, coastal defence, development, nature conservation, heritage conservation, recreation and sport, tourism and economic development.

3.2.1.6 Examples are available of similar sites (see Appendix 17) which would assist this process and, as with any other project, best practice guidelines in web site design should be followed. It would be relatively straightforward to include all current reports eg. topic papers, management guidelines etc. in digital form although preferable that they should be down-loadable documents. The IRGTG also strongly support the development of a digital directory listing of available datasets (see Section 3.1.3.2)

3.2.1.7 Coastal information that is of general interest to local households may also be a prime candidate for inclusion, potentially through the use of maps. A draft list of potential datasets has been given in Appendix 12. Other more advanced Web technologies could also be considered such as permanent cameras ('Web cams') to attract people to the Web site. It is often suggested that a site needs some kind of gimmick in order to attract attention!

3.2.1.8 Security may also be an issue. It would be possible to restrict access to all or parts of the web site based on its purpose. Effectively a site could be created which only allowed access to partners.

3.2.1.9 It is certainly the case that a web site will evolve as new opportunities arise and there is no reason why some areas could not be implemented more fully than others during an initial development phase. It is useful however, in design terms, to be aware of likely future developments so that the structure of the site can be maintained in a consistent way. Appendix 17 lists many potentially useful Internet links.

3.2.2 Use of GIS

3.2.2.1 Although the goal of an all-encompassing GIS system combining 'under one roof' all relevant datasets and carrying out integrated analyses is an ideal, in practice the MFP is unlikely to have the long-term resources to undertake such a task. Many partners within the MFP have or are developing their own GIS capabilities and a more practical solution, under these circumstances, is to generate a 'climate of open information exchange'. In effect this should lead to a distributed network of GIS resources around the Moray Firth linked more by an agreed vision rather than cables. As the group's initial objectives make clear, partners should agree to utilise these systems to address Firth-wide issues of interest to them. Formal organisational and political agreements need to be discussed by the MFP Management Group and respective partners to facilitate such an approach.

3.2.2.2 The main limitation of an issue-driven strategy for addressing management issues is that some issues are so cross-sectoral that it would probably prove very difficult to persuade any single organisation to take on the responsibility of GIS work. Oil spill planning and response for example relies on a large number of organisations to fulfil their statutory and non-statutory responsibilities and no single party is likely to take sole responsibility for developing an integrated information system. In such cases it may be necessary to form a sub-group of partners or even a more formal consortium all of whom would share in the costs of work being carried out externally. This work could be effectively co-ordinated by the partnership.

3.2.3 Use of related technologies

3.2.3.1 Other digital technologies were also considered by the IRGTG such as publishing information on CDs. These could prove useful provided the information held on them was not subject to rapid changes. Full scale multi-media publishing would certainly be possible although likely to prove costly. There are examples of educational CDs being developed in the US to promote awareness of river basins while the EC has used its LIFE Programme to fund the development of the Estuales Group - including the Clyde, Severn and Wear - to explore the application of CD-ROMs to assist CZM.

3.3 Coastal Management Issues

3.3.1 A range of information and research related coastal management issues have been identified in Appendix 14. These have been drawn directly from the topic papers currently available. Issues relating to 'Research', being part of the remit of the IRGTG, are included separately below in Section 3.3.2.

3.3.2 Research

3.3.2.1 There is a need to promote a closer co-operation between organisations with a coastal/marine interest in the Moray Firth and students and researchers looking to carry out research. This would

effectively bridge the gap between research and practical management issues. There are comments in several of the topic papers to this regard. It would offer considerable mutual benefits, particularly in a situation where the MFP has limited financial resources but does have offers of assistance in-kind by partners.

3.3.2.2 There are a number of roles that the MFP could offer:-

- Act as an information broker between research institutes and organisations establishing channels of communication.
- Identify suitable research topics that are of practical use and build on research that has taken place.
- Provide a one-stop-shop over the internet for general information of value to researchers (eg. topic papers) about the Moray Coast and also a directory of related research already carried out.
- Provide a means of accessing abstracts of academic papers.
- Provide useful links to other organisations with similar interests.
- List local organisations and contact addresses for potential employment opportunities.
- Documents on the web site would be down-loadable and therefore researchers would not have to approach the Moray Firth Secretariat - this should save their valuable time answering queries.
- MFP Secretariat would be able to refer any queries regarding research opportunities to the web site and thus transferring the power to access information to the information requester.
- MFP could act as vehicle for external sponsorship of research.

3.3.2.3 The MFP could have a major role in co-ordinating and promoting useful research on the Moray Firth with relatively minimal investment. It needs to strengthen links with specific University departments around the Moray especially within the new University of the Highlands and Islands, but also wider afield in Scotland and the UK. Departments such as the Dundee University Centre for Coastal Zone Research need to be targeted which specialise in coastal zone management.

4. OPPORTUNITIES AND RECOMMENDATIONS

The following recommendations are proposed by the IRGTG as mechanisms to respond practically to the issues identified in Section 3. Where possible, financial estimates have been given either within the text or as appendices as an indication of resources required.

4.1 Addressing information issues

4.1.1 Developing an Information Management Strategy

4.1.1.1 In line with the DoE report (1996) on best practice in coastal management it is recommended that a formal Information Management Strategy is set up. This should be based directly on information needs, it should determine what information is held and where gaps exist, it should detail the most appropriate means of obtaining and managing information, and finally it should consider how best to convey information to all partners and the public. It should also consider longer-term issues such as the maintenance of any information systems. In effect it could outline the role of the MFP could as an 'information broker', facilitating the link between supply and demand between different partners and also partners and the public.

4.1.1.2 Within a wider information strategy, a more practical focus should be adopted based on specific issues which could demonstrate practical and measurable benefits to the environment and people of the Moray coast (see Section 3.1.1.2)

4.1.1.3 The strategy should describe methods to ensure effective networking with other organisations/projects in order to exchange relevant information. It should explicitly detail how information channels can be established and maintained. Likewise, effective networking channels within the partnership should also be considered to ensure, for example, that any information system developments are, wherever possible, complimentary to those taking place within partner organisations.

4.1.1.4 Specifically, there is significant overlap between initiatives being carried out by the MFP and those of the Highland GIS Forum and the TITAN project. A channel of communication should therefore be maintained to feedback relevant information to all 3 projects. The group should also encourage links and support from external organisations involved in coastal zone management such as KIMO, The North Sea Commission Environment Group (Scotland), PESCA (see Coastal Defence paper) and ERDF (see Coastal Defence paper) to provide advice, funding, resources etc. A MFP web site would provide an ideal opportunity to enhance existing linkages and develop new ones both through providing a 'Linked Sites' page on the MFP site and through registering with other organisations with broader (Eg Scotland On-Line) or related (eg. CoastNet) interests.

4.1.2 Information Formats

4.1.2.1 A balance of different information formats and media should be adopted in order to suit specific purposes. Although there is clearly a technology barrier, particularly within the 'unorganised' community, innovative and creative approaches to the supply of digital information through the Internet should still be promoted given its huge potential and rapid expansion. In many cases, information published in a digital form on the web can also be published in a more traditional manner as leaflets, posters, newsletters or directories. There would be obvious benefits in liaising with representatives from the Involving Communities Topic Group to ensure that any type of Community Information System would prove useful.

4.1.2.2 The IRGTG suggests that a regular, perhaps bi-monthly, Information Newsletter should be established which would publicise information-related and research issues within the Moray Firth. This would be 'factual' (rather than 'glossy') and aimed at the 'organised' community. Ideally such a newsletter could be widely and cheaply distributed by e-mail in a digital format provided there was a sufficient on-line audience.

4.1.2.3 Topic Papers and any more summarised information should be available through local information outlets such as libraries and environmental information centres.

4.1.2.4 There was widespread support for a Conference on the Moray Firth open to all members of the 'organised' and 'unorganised' communities. This would meet many of the information sharing objectives of the IRGTG notably an ideal forum to promote work being carried out and a way of raising the profile of the MFP. Attempts should be made to involve as wide a range of participants as possible and incorporate a range of different issues. It would also provide an opportunity for associated seminars, practical workshops, demonstrations and a poster exhibition. As much information as possible should be sought from attendees when registering to build up a comprehensive profile of interested parties.

4.1.3 Information Sources

4.1.3.1 Access to relevant and up-to-date information lies at the heart of effective coastal zone management. At present there is no simple way of finding out what information is available on the Moray Firth and who holds it. Lack of awareness of information sources is commonly identified in other reports (Scottish Office, 1996) as being very detrimental to information availability. The IRGTG should consider an audit of generic datasets suitable for being held within an information system building on existing audits. This would provide an indication of the range and current format of relevant information. Such action would be in line with the Scottish Office report (1996) which recommends that *"a comprehensive and easily updateable directory of information sources and gateways to environmental information (relevant to Scotland) should be commissioned"*.

4.1.3.2 A detailed directory would be extremely time-consuming to develop, particularly when many large organisations are not fully aware of all the information they hold (let alone associated details about it). It is suggested a generic information directory could be developed listing the types of information that an organisation will hold eg. census-related data, economic development statistics etc. In future, if needs arise, such an audit could evolve into a more detailed listing built on specific datasets. Lessons on building such catalogues incorporating European and UK standards can be learnt from other organisations such as BODS, British Geological Survey and Ordnance Survey (web sites detailed in Appendix 17). Section discusses how such a recommendation could be implemented.

4.1.3.3 Much research is being proposed by the MFP topic groups. In many cases data with more widespread use will result from these pieces of work. In order to maximise the utilisation of these datasets and facilitate their exchange they should, wherever possible, be collected in appropriate digital formats and be compatible with information systems detailed in Section 4.2 below.

4.1.3.4 Digital data sharing between MFP partners will increase significantly as awareness grows of available information and new systems are developed. The MFP could actively encourage this dissemination through research into the best way of creating a 'climate of openness' for data exchange. The IRGTG should consider commissioning a report on the most appropriate way to create an open climate for data exchange amongst partners. The report should address standards for metadata (see Section 4.1.4.3 below), suitable licence agreements and technical guidelines on the most appropriate means of GIS data exchange. It would be of particular importance given the relatively early stages of development of many of these systems and the current emphasis on many large organisations to make their datasets more widely available. The report would also include export and import methods currently being advised by the main GIS vendors to suit their products.

4.1.4 Standards

4.1.4.1 The collection of information in an appropriate digital format should be encouraged wherever possible. Any commissioned work should make explicit reference to a digital version of the deliverables.

4.1.4.2 Before any information systems are developed, information and IT standards adopted by partners should be examined to ensure consistency wherever possible. For example, most Local Authorities which have some form of access to the Internet are seeing corporate standards emerging. The range of software tools (browsers) used to 'browse' the Internet and means of access to the Internet (affecting performance etc) within the 'unorganised community' is also likely to be large and necessitates careful consideration when designing a web site to maximise the potential audience.

4.1.4.3 The establishment of geographical data standards common to all partners would also be of major benefit to information exchange (see Section 3.1.4). Specifically, these would include a recognised standard of interchange format allowing GIS datasets to be exchanged between different systems and standards of metadata describing these datasets which are currently being established at national and international levels. It is suggested that these are set out in a report (see Section 4.1.3.4 above).

4.1.5 Copyright and Licensing

4.1.5.1 The MFP Management Group should have a recognised policy on ownership of information which it collects or compiles. If there is already an existing policy then this should be publicised. From a legal standpoint, it would be simpler to ensure that any information collected by partners, or through contractors on their behalf can be released openly into the public domain. This would, of course, mean that information released to the MFP could be distributed openly and may dissuade some organisations from giving permission to allow their own information to be passed to the partnership. There are usually ways of generalising or modifying these datasets in order to avoid such problems. It is unlikely there would be ways of limiting 'MFP information' to partners given it is a voluntary organisation. The alternative is to create a legally recognised body - this is the route that the Forth Estuary Forum have taken, becoming a limited company with partners paying a membership.

4.1.5.2 Licence agreements to display information on a Web site require specific negotiation. Many organisations do not yet have formal policies in place in this regard. There is often a fear expressed that detailed information will be openly available to the public to use or misuse. Once the MFP have agreed on the information content of the Web site, licences with internal and external information contributors may need to be drawn up to formalise the level of access and the security of the datasets which can be displayed on the site.

4.1.5.3 The MFP should ensure that they are registered under the Data Protection Act since they are maintaining address information. There is a nominal fee for registration.

4.2 Addressing Information System Issues

4.2.1 Use of the Internet

4.2.1.1 The effectiveness of current procedures for information management and dissemination within the MFP should be assessed in order to take advantage of digital technologies, particularly the use of the Internet. Other organisations which have carried out such reviews could provide valuable information as to costs/benefits etc.

4.2.1.2 An assessment of the current level of Internet access should be carried out amongst all partners including whether organisations are intending to provide this facility in the near future. All e-mail addresses should be recorded.

4.2.1.3 The MFP Secretariat should be setting an example to other partners in terms of efficient management and dissemination of information. To this regard it should review existing procedures, in particular examine the benefits that access to the Internet could provide. Currently, by not having access itself, it is limiting the use of the Internet for other partners when carrying out MFP work. It is possible that an extremely strong case could be made for Internet access for the Secretariat within the existing host office, particularly now that an increasing number of partners are 'on-line'. The resource implications of such a development are given in Appendix 15.

4.2.1.4 The MFP should actively encourage widespread Internet access as the most effective means of selective mass communication between partners. The e-mail service in particular provides an ideal 'communication back-bone' on which to build a distributed, partnership-based organisation. Such on-line access is being actively supported by central government and such a policy would be entirely in line with other initiatives both nationally and locally. There is an increasing volume of information regarding the benefits of an Information Society (see www.open.gov.uk) and the means to put this into

practice. For example, standards to ensure cross-organisational compatibility are emerging. There is also the experience of local partners eg. Moray Council, Highland Council.

4.2.1.5 With on-line access, the MFP Secretariat could then explore ideas such as creating pre-structured mailing groups of e-mail users such as the members of the coastal defence topic group which could act as a means of keeping all interested parties from different organisations informed of new developments. There would also be opportunities to create on-line discussion groups which could be limited to certain users or opened up to the public.

4.2.1.6 The IRGTG strongly support the concept of a Web presence for the MFP. This is being widely adopted by many organisations, particularly those which represent a partnership or consortium due to its 'virtual' and therefore geographically-independent nature. It will allow the MFP to publicise its work to a much wider audience both locally, nationally and internationally. It is suggested that such a proposal, far from being a response to 'Information Issues', should be seen as a means of drawing together many of the objectives of the MFP and therefore its development would merit significant resources. The resource implications of such a development are given in Appendix 15.

4.2.1.7 A dedicated Web Site Steering Group within the MFP should be established comprising of technical advisers, coastal specialists and project managers. They should focus on issues such as content, purpose, and resources that are raised in Section 3.2.1.

4.2.1.8 Advice on web site development should be sought from other partners who are 'further down this road'. They are likely to have carried out studies, for example, into levels of access amongst their target groups whether it is local citizens or businesses. This would act as a useful indicator to assess the effectiveness of an Internet based web site. Some partners such as the Moray Council are looking to expand the level of 'public access points' to their Web site and it would therefore be useful to ensure some degree of co-ordination so that the MFP web site was also available at these access points. In this way it may be possible to 'piggy-back' on those organisations who are taking the lead in this area.

4.2.1.9 It would be advisable in the longer-term to provide HTML language training to a member of staff of the MFP in order that updates to the site could be carried out whenever they are required. This would also significantly reduce maintenance costs.

4.2.2 Use of a distributed GIS network

4.2.2.1 The MFP Management Group should seek more formalised ways to encourage partners to take an active, participatory role in providing GIS resources and appropriate data to address specific issues. It is likely that 'lead partners' with a direct interest in the issue will need to be appointed in order to co-ordinate activities.

4.2.2.2 Where coastal issues are either currently falling through the 'organisational net' or not being addressed adequately due to their cross-sectoral nature, geographical distribution or out of economic necessity it may be that the MFP could assist in funding or partially funding commissioned work. This may be the case for issues such as oil spill planning and response where contingency plans are frequently fragmented and, due to operational responsibilities, marine areas are treated independently of terrestrial areas. It may also be the case for coastal defence and flood-risk issues where responsibilities are even more fragmented and unclear. Both examples have been addressed at other sites using GIS technology. Where there is a requirement to compile relevant datasets, carry out specific analysis and present results (eg. identifying suitable areas for managed retreat) this is likely to be less time-consuming than formal development of a 'live' system to be implemented within organisations for managing relevant datasets (eg. oil spill planning and response system).

4.2.3 The use of related Information Technology

4.2.3.1 In support of an Internet connection, the Secretariat should also review its use of appropriate technologies for managing MFP information. For example, office management software such as 'Super Office', 'Act' or 'Teamwork' can be purchased to manage all contact information and

correspondence. It would also provide utilities such as auto-creation of letter templates and address labels. Packages cost in the region of £150. This would dramatically enhance staff effectiveness.

4.2.3.2 Internet access will never be available to all partners and therefore ways should be found to make the information system available through other means. The MFP should investigate potential of publishing the Web site on CD using standard Web browsers. There are also early versions of GIS packages such as ArcView Version 1 which are freely available and could be used to publish GIS information. The cost of both options would depend largely on how 'polished' the final product needed to be and the number of CDs required but would probably be less than £500.

4.2.3.3 The potential to publish information electronically on CDs should be explored further, particularly with reference to the Esturiales project funded by the EC (see Section 3.2.3 and Appendix 5).

4.3 Addressing Coastal Management Issues

4.3.1 Clear policy guidelines are required from the Management Group on the way issues will be tackled. It is suggested issues could be prioritised based on the benefits that would be derived and the resources required to address them. In the case of more complex issues requiring an element of GIS, it would be ideal to carry out a series of demonstration applications, preferably using the systems and resources of different partners and involving wider data exchange as suggested in Section 4.2.2 above.

4.3.2 The issues raised in Appendix 14 which are likely to benefit from an information system-based approach or which provide research potential should be reviewed and any further issues added. These could then be prioritised within the framework of the Information Management Strategy and assessed in a structured manner (see Section 3.1.1.3).

4.3.3 There is considerable overlap between the issues discussed in this paper and those likely to be discussed by the Education and Interpretation and Involving Communities topic groups. In particular, this centres on dissemination of information in appropriate ways to promote community awareness and participation. The issues raised in all three topic papers should be assessed and recommendations put forward which reflect their complimentary nature. It is hoped, for example, that part of the MFP web site could be developed as a community information system providing information which is of general interest to Moray Firth citizens, households and communities (see Appendix 12).

4.3.4 Research

4.3.4.1 In order to maximise the benefits from existing research of the Moray Firth and related coastal issues, and to avoid duplication, MFP members and researchers should be able to go to a single information source for a comprehensive inventory of research on the Moray Firth. An ideal location for such an inventory, given the existing level of Internet usage within the research arena, would be on the web where it could be grouped according to different categories and would have a search facility (search engine) to assist users in locating the reference and/or abstract they require.

4.3.4.2 Based on the table in Section 2.5.2 and Appendix 14 it should be possible to target particular research institutions which are likely to be interested in research proposals. The MFP could act as the facilitator by approaching key researchers/academics and explaining that there would be opportunities to carry out research on behalf of partners. The idea would require the broad support of partners to ensure that they could provide the necessary support.

4.3.4.3 Once open lines of communication between key individuals in partner organisations and their research/academic counterparts have been established, they should be maintained independently of the MFP. This should not result in these partners being inundated with possible proposals - any proposals should be vetted by the academic representative and then forwarded through these established lines. This would result in a more trusting and worthwhile relationship which, in turn, would yield better results.

4.3.4.4 Organisations, including the MFP, which put forward research proposals should set-aside a specific amount of time within the span of the project to commit to guiding this research. This period or number of meetings should be established up-front with the research organisation.

4.3.4.5 By overseeing past and present research, the MFP will be in a situation to highlight areas where there are gaps. Moray Firth partners should therefore be invited to propose suitable new research topics which could be posted on the MFP web site. These should broadly accord with MFP objectives, as laid down in the topic papers,

4.3.4.6 The MFP should request that all proposals for research projects are presented in a standard format (see Appendix 1 of Forth Estuary Forum Awareness and Education topic group paper as a guideline).

4.3.4.7 There should be broad agreement that any research work carried out through these channels can be publicised to other partners through the MFP web site on completion.

4.3.4.8 The MFP could be used as a neutral body for attracting financial sponsorship to carry out local research. The fact that locally based research can not only underpin educational programmes but also have direct economic benefits and result in the creation of jobs could facilitate this.

4.3.4.9 University based research opportunities should increase considerably with the development of the University of Highlands & Islands and there is currently a unique opportunity with this institution 'on the doorstep' to create close relations and derive mutual benefits.

APPENDICES

Appendix 1 Case Studies of Coastal Information Systems: Florida, USA

The Coastal Zone Management Act (1972) highlighted the importance of more integrated strategies to managing coastal zones although it was not until the 1980s when GIS technology became more mainstream that significant progress could be made. The coastal management issues facing Florida were similar to those of many other areas. Much of the information needed to make critical decisions was held in many different formats and located in many different agencies. Rarely were the decision-makers in possession of all the necessary information. However, major initiatives were established in the early 1980s to address these problems many of which continue to be tackled with the latest technology today.

1. Florida Marine Resource Institute (FMRI) (Friel, 1997)

The staff of the Florida Marine Research Institute (FMRI) are charged with providing high quality marine and coastal information to local, state and federal agencies and also the general public. FMRI's Coastal and marine Resource Assessment (CAMRA) program began development of the Marine Resources GIS (MRGIS) in 1983 to fulfil this role of information management and delivery.

The MRGIS database includes datasets on shoreline and near-shore bathymetry, benthic habitats, navigation aids, seagrass areas, boating use, populated areas, road networks, aquatic preserve boundaries and manatee protection zones. It has grown rapidly in size (to 140 Gb) and has emerged as the de facto clearinghouse for coastal and marine geospatial datasets in Florida. The information system has been used as the basis for a number of projects:

- The Florida Keys National Marine Sanctuary Water Quality Protection Program is funded by the US Department of Environmental Protection to develop a management plan for the monitoring of water quality for the sanctuary. The project was undertaken to develop a distributed data management system to store biological, chemical, physical and geospatial datasets. The goal is to provide open access for metadata browsing and searching as well as interactive mapping across the Internet and data retrieval.
- The Statewide Ocean Resource Inventory (SORI) has been developed to publicise the most pressing issues facing more than 30 'development partners' with coastal interests including state and local government, water management districts, regional planning councils, universities and non-government organisations. The project has used ArcView to allow coastal and marine resource managers to query and display data by issue, geographic place or regulatory considerations. Internet access is also being provided to allow interested parties to 'Surf Your Watershed'.
- A development strategy is underway to establish a FMRI Web Forum. This will create a public outreach and information exchange forum via the Web and provide direct access to the FMRI in a highly interactive manner. The scoping exercise includes the integration of web-based mapping, standard mechanisms for database query and thematic mapping, educational content and interactivity, mechanisms for soliciting and capturing input and feedback from the public and other related issues.
- A proposal to create a Geospatial Data Clearinghouse for providing metadata that conforms to Federal Geospatial Data Committee standards over the Internet. In the longer-term this will be extended to include interactive mapping and data delivery.
- Development of Resource Impact Maps depicting water depth, seagrasses, and areas of bait and food shrimp harvesting for the Marine Fisheries Commission.
- Considerable collaborative work with the National Oceanographic and Atmospheric Administration (NOAA) and the GIS software vendor ESRI has led to the development of digital data standards and application tools for marine spill contingency planning including environmental monitoring, resource mapping, contingency planning, resource cleanup and injury assessment.

The demand for coastal geospatial data is increasing significantly as the performance of GIS software has increased while prices have dropped. The MRGIS has emerged as Florida's de facto coastal GIS data clearinghouse serving more than 500 information requests annually. In 1994, the Ford Foundation recognised CAMRA with an Innovations in Government award for use of advanced GIS technology in environmental protection efforts.

South Florida Regional Planning Council (Arc News Spring 1997)

Other GIS initiatives within Florida have benefited from this open exchange of information. The South Florida Regional Planning Council has set up the Florida Marine Resource Information System based on ArcView GIS to support critical planning decisions. A typical example of how the GIS would be used would be to display all necessary site information including environmental sensitivity and statutory controls where a proposal had been received to build a single-family dock in the Florida Keys.

The datasets for the GIS have been provided by as many as 50 different agencies while the project demonstrates that "...you can get all the way down to the decision-maker's desktop without making them a GIS guru".

Appendix 2 Generic Datasets relevant to coastal zone management.*Physical Environment*

Seabed sediments	Tidal ranges	Solid Geology
Hydrography	Geomorphology	Bathymetry
Sea Surface Temps	Salinity	Dune Formations
Rivers	Lakes	Coastline
Meteorological data	Other Chemical Parameters	

Natural Environment

Cetaceans	Waders and Wildfowl	Pinnipeds
Plankton	Other mammals (Seals, dolphins etc.)	Non commercial fish
Invertebrates	Seabirds	
Seabird Colonies	Littoral and Sublittoral Habitats	

Shipping, Navigation and Communication

Capital Dredging Services	Infrastructure Maintenance Dredging	Navigation Channels
Shipping routes	Shipping operations	Territorial Limits
Boat launch sites		Commercial ports

Coastal Engineering Works

Breakwaters	Flood Barriers	Coastal Protection
Tidal Defence	Impoundment Structure	

Mineral Extraction and Energy Generation

Aggregate dredging	Gas Exploration	Oil Exploration
Mining	Coastal Quarries	Undersea cables / pipelines
Oil drilling	Coastal power generation	

Nature and Landscape Designations

Terrestrial Sites	Landscape Sites	Intertidal Sites
Geological Sites	Marine Sites	Amenity Sites
Local distinctiveness	Landscape assessment	Aesthetic Value
Cultural / Historical sites	Sea Wrecks	

Waste Disposal and Effluent Discharge

Spoil Disposal	Pollution Incidents	Sewage Disposal
Agricultural Effluent	Industrial Effluent	Litter
Discharge Sites	Water intake sites	

Coastal Industry and Settlement

Land Claim	Dockyards	Urban Development
Marinas	Local Communities	Industrial Development
Ports and Harbours		

Military Use

Ammunition Storage	Exercise Areas
--------------------	----------------

Fisheries and Aquaculture

Sea Fishing	Fish Spawning and Nursery Grounds	
Salmonid Fishing	Eel Netting	Fish Farming
Bait Digging	Shellfish Farming	Shellfish Collection

Recreation

Power Boating	Walking	Jet Skiing
Nature Watching	Water Skiing	Wildfowling
Sailing	Swimming	Windsurfing
Access	Mooring/Anchoring	Camping
Sub Aqua	Horse Riding	Rowing
Motor Cycling	Canoeing	Cycling
Angling	Beach activities	Gliding
Golf	Motorcycling / 4WD	Yacht clubs

Access

Car Parks	Roads	Routes to shoreline
Footpaths	Railways	Cyclepaths
Airports	Helicopter landing sites	

Contextual Data

Backdrop data e.g. OS maps, Admiralty charts		Land use
Lat/Long graticule	Telephones	Property ownership

Appendix 3 Moray Firth Datasets in SNH GIS

NAME	COPYRIGHT	CLASS	SHP_TYPE
Unitary Authority Boundaries - polygon	Scottish Office	Administrative	polygon
SNH Boundaries 1995 - polygon	Scottish Natural Heritage	Administrative	polygon
SNH Boundaries 1997 - polygon	Scottish Natural Heritage	Administrative	polygon
Vice County Boundaries - line	Scottish Natural Heritage	Administrative	line
SNH Offices	Scottish Natural Heritage	Administrative	point
Vice County Boundaries - polygon	Scottish Natural Heritage	Administrative	polygon
Unitary Authority Boundaries - line	Scottish Office	Administrative	line
Old LA Boundaries - polygon	Scottish Office	Administrative	polygon
SNH Boundaries 1995 - line	Scottish Natural Heritage	Administrative	line
SNH Boundaries 1997 - line	Scottish Natural Heritage	Administrative	line
Areas of Search	Scottish Natural Heritage	Administrative	polygon
Grant Locations	Scottish Natural Heritage	Administrative	point
Coastline (1:200K)	Automobile Association	Coastal	line
Coastline (1:25K) - polygon	Macaulay Land Use Research Institute	Coastal	polygon
National Nature Reserves	Scottish Natural Heritage	Designated Areas	polygon
Special Areas for Conservation	Scottish Natural Heritage	Designated Areas	polygon
Special Protection Area	Scottish Natural Heritage	Designated Areas	polygon
SSSI	Scottish Natural Heritage	Designated Areas	polygon
Biogenetic Reserves	Scottish Natural Heritage	Designated Areas	polygon
Biosphere Reserves	Scottish Natural Heritage	Designated Areas	polygon
Council of Europe Diploma Sites	Scottish Natural Heritage	Designated Areas	polygon
Environmentally Sensitive Areas	Scottish Office	Designated Areas	polygon
Historic Gardens & Designed Landscapes	Scottish Natural Heritage	Designated Areas	polygon
Local Nature Reserves	Scottish Natural Heritage	Designated Areas	polygon
National Scenic Areas	Scottish Office	Designated Areas	polygon
RAMSAR Sites	Scottish Natural Heritage	Designated Areas	polygon
World Heritage Site	Scottish Natural Heritage	Designated Areas	polygon
National Trust Properties	National Trust of Scotland	External Organisation	point
RSPB Reserves	Royal Society for the Protection of Birds	External Organisation	point
SWT Reserves	Scottish Wildlife Trust	External Organisation	point
Habitat Survey Sites	Scottish Natural Heritage	Habitat Other	polygon
Ancient Woodland Inventory	Scottish Natural Heritage	Habitat Other	polygon
Semi-natural Woodland Inv.	Scottish Natural Heritage	Habitat Other	polygon
Intermediate Bog Inventory	Scottish Natural Heritage	Habitat Other	point
Raised Bog Inventory	Scottish Natural Heritage	Habitat Other	point
Bing Surveys	Scottish Natural Heritage	Habitat Other	point
Bing Sites	Scottish Natural Heritage	Habitat Other	point
Sand dune survey (points)	JNCC/ITE	Habitat Other	point
Sand dune survey (lines)	JNCC/ITE	Habitat Other	line
Saltmarsh Survey	JNCC	Habitat Other	point
LCS88 - polygon	Scottish Office	Land Cover	polygon
LCS88 - line	Macaulay Land Use Research Institute	Land Cover	line
LCS88 - point	Macaulay Land Use Research Institute	Land Cover	point
LCA Argyll and Firth of Clyde	Scottish Natural Heritage	Landscape	polygon
LCA Banff and Buchan	Scottish Natural Heritage	Landscape	polygon

LCA Cairngorm	Scottish Natural Heritage	Landscape	polygon
LCA Dumfries and Galloway	Scottish Natural Heritage	Landscape	polygon
LCA Moray Firth	Scottish Natural Heritage	Landscape	polygon
LCA Skye and Lochalsh	Scottish Natural Heritage	Landscape	polygon
LCA Western Isles	Scottish Natural Heritage	Landscape	polygon
River Catchment Boundaries	Scottish Office	Landscape	polygon
OS 1:50 000 Backdrop Mapping	Ordnance Survey (GD03006G)	OS Reference	other
OS 100km Grid	Ordnance Survey (GD03006G)	OS Reference	polygon
OS 1:10,000 Map Index	Ordnance Survey (GD03006G)	OS Reference	polygon
OS 1:50,000 Map Index	Ordnance Survey (GD03006G)	OS Reference	polygon
OS 10km Grid	Ordnance Survey (GD03006G)	OS Reference	polygon
Country Parks	Scottish Natural Heritage	Recreation and Access	point
Regional Parks	Scottish Office	Recreation and Access	polygon
West Highland Way	Scottish Natural Heritage	Recreation and Access	line
Vascular Plants - BRC	Biological Records Centre (ITE)	Species	point
Great Crested Newt Sites 1996	Scottish Natural Heritage	Species	point
Great Crested Newt Survey 1996	Scottish Natural Heritage	Species	point
Rare Plant Sites	Scottish Natural Heritage	Species	point
Charophyte - BRC	Biological Records Centre (ITE)	Species	point
Bryophyte - BRC	Biological Records Centre (ITE)	Species	point
Moorland Bird Survey Sites	Scottish Natural Heritage	Species	polygon
Lepidoptera Records	Scottish Natural Heritage	Species	point
Invertebrate Site Register	Scottish Natural Heritage	Species	point
Biogeographical Zones - 10km	Scottish Natural Heritage	Zones	polygon
Biogeographical Zones - 500m	Scottish Natural Heritage	Zones	polygon
Biogeographical Zones - illustrative	Scottish Natural Heritage	Zones	polygon
Natural Heritage Zones	Scottish Natural Heritage	Zones	polygon
Peat soils: BGS 1:50000 Blanket Bog	Scottish Natural Heritage	Geology	polygon
Peat soils: BGS 1:50000 Other Bog	Scottish Natural Heritage	Geology	polygon
Peat soils: BGS 1:625000 Blanket Bog	Scottish Natural Heritage	Geology	polygon
Peat soils: BGS 1:625000 Other Bog	Scottish Natural Heritage	Geology	polygon
Soil Survey 1:250000 Blanket Bog	Scottish Natural Heritage	Geology	polygon
Satellite Scene Distribution	Scottish Natural Heritage	Geology	polygon
LCA Aberdeenshire	Scottish Natural Heritage	Landscape	polygon
Coastline (1:25K) - line	Macaulay Land Use Research Institute	Coastal	line
Lat/Long Grid (5')	SNH	Moray Firth	line
Area of Interest	SNH	Moray Firth	polygon
Low Water (Moray)	OS	Moray Firth	line
Inter-tidal area (Moray)	SNH	Moray Firth	polygon
Cromarty Bird counts	BTO/WWT	Moray Firth	line
Sea Bird Colonies (Moray)	JNCC	Moray Firth	point
Wildfowl Counts (Moray)	WWT	Moray Firth	point
Salmon Catches	SO	Moray Firth	point
Otter Abundance	Vincent Wildlife Trust	Moray Firth	point
Seal Abundance	Aberdeen University	Moray Firth	polygon

Seal Haul-out sites	Aberdeen University	Moray Firth	point
Dolphin Distribution 1	Aberdeen University	Moray Firth	point
Dolphin Distribution 2	Aberdeen University	Moray Firth	line
Dolphin Distribution 3	Aberdeen University	Moray Firth	line
Coastal Cells (Moray)	SNH	Moray Firth	polygon
Shipping Lanes	SO	Moray Firth	line
LSA photos (Moray)	SNH	Moray Firth	point
Bathymetry (Moray)	BGS	Moray Firth	polygon
Quaternary Thickness (Moray)	BGS	Moray Firth	polygon
Sea Bed Sediments (Moray)	BGS	Moray Firth	polygon
Outer Fishery Limit	Hydrographic Office	Moray Firth	line
Inner Fishery Limit	Hydrographic Office	Moray Firth	line
Fishing Vessels	SOAFD	Moray Firth	point
Fish catch	SOAFD	Moray Firth	polygon
Access Points (Moray)	RSPB	Moray Firth	point
Sea defence (Moray)	RSPB	Moray Firth	point
Pipes (Moray)	RSPB	Moray Firth	point
Oil Industry (Moray)	RSPB	Moray Firth	point
Oufall Sites (Moray)	RSPB	Moray Firth	point
Moorings (Moray)	RSPB	Moray Firth	point
Industry (Moray)	RSPB	Moray Firth	point
Camping/Caravaning (Moray)	RSPB	Moray Firth	point
Land Extraction (Moray)	RSPB	Moray Firth	point
Land Dumping (Moray)	RSPB	Moray Firth	point
Car parks (Moray)	RSPB	Moray Firth	point
Airports (Moray)	RSPB	Moray Firth	point
Dornoch Biotopes	SNH	Moray Firth	polygon
Dornoch Sediments	SNH	Moray Firth	polygon
Dornoch Littoral Stations	SNH	Moray Firth	point
Dornoch Sub-Littoral Stations	SNH	Moray Firth	point
Findhorn Bay Photo	SNH	Moray Firth	image
Recreational Study Areas (Cromarty)	SNH	Moray Firth	polygon
Bird Watching Areas (Cromarty)	SNH	Moray Firth	polygon
Wildfowling Areas (Cromarty)	SNH	Moray Firth	polygon
Beach Activities (Cromarty)	SNH	Moray Firth	polygon
Sailing Areas (Cromarty)	SNH	Moray Firth	polygon
Scuba Dive sites (Cromarty)	SNH	Moray Firth	point
Dolphin Cruises (Cromarty)	SNH	Moray Firth	line
Canoeing Routes (Cromarty)	SNH	Moray Firth	line
Cruise ship berths (Cromarty)	SNH	Moray Firth	point
Walking (Cromarty)	SNH	Moray Firth	line
Quad Biking (Cromarty)	SNH	Moray Firth	polygon
Golf Courses (Cromarty)	SNH	Moray Firth	point
Dolphin Watching (Cromarty)	SNH	Moray Firth	line
Cycling Routes (Cromarty)	SNH	Moray Firth	line
Clay Pigeon shooting (Cromarty)	SNH	Moray Firth	point
Car Parks (Cromarty)	SNH	Moray Firth	point
Satellite Image	SNH	Moray Firth	image
Coastal Land cover (Moray)	SNH	Moray Firth	polygon

Appendix 4 Other Information Sources

Datasets held as part of UK Digital Marine Atlas Project (UKDMAP)

Marine geology and geomorphology; marine and coastal parks, reserves and protected areas; marine and coastal conservation in Great Britain; sea birds; sea mammals; marine biology (including MNCR records); currents, tides and surges; winds, waves and weather; seawater temperature, salinity and nutrients; chemical distributions; exploitation of the marine environment; fishing areas and fish spawning areas; data catalogues.

There is also a review of this software on the Marine Resource Management web site (listed in Appendix 10).

Marine Nature Conservation Review

The Marine Nature Conservation Review (MNCR) was started in 1987 to survey and assess the coastal marine habitats of the UK.

“The MNCR covers the coastline of England, Scotland and Wales (excluding the Isle of Man and Channel Isles), from the lower limit of terrestrial flowering plants out to the limit of territorial seas, and into estuaries to the limits of maritime influence. MNCR studies concentrate on the benthos (wildlife of the seashore and seabed).

The MNCR aims to:

- extend our knowledge of benthic marine habitats, communities and species in Great Britain, particularly through description of their characteristics, distribution and extent;
- identify sites and species of nature conservation importance.” (MNCR team, JNCC)

The MNCR database is held on computer in the Advanced Revelation System. There are two main parts to the system: bibliographic information and storage and analysis capabilities for habitat data from field surveys. Geographical information is limited points, for example the types of habitat data found at a particular survey site. This system is also linked to UKDMAP so that maps showing species distribution can be produced.

British Oceanographic Data Service (BODS)

BODS was established in 1989 by the Marine Science Directorate of the Natural Environment Research Council (NERC) to act as a data centre for the support of UK marine science. The main aims of this group are to:

- provide data management support for UK marine science
- maintain and develop the UK's national oceanographic database
- make high quality oceanographic data readily available to UK research scientists, commerce and government
- develop innovative marine data products and digital atlases
- collaborate, on behalf of the UK, in the international exchange and management of oceanographic data.

The BODS web site can be found at www.nbi.ac.uk/bodc/bodcmain.html

European Directory of Marine Environmental Data (EDMED)

EDMED was designed to provide a comprehensive reference to the marine environmental data held within Europe so as to provide marine scientists, engineers and policy makers with the means of identifying potentially useful data sets. EDMED is a computerised system containing descriptions of 2180 data sets from eleven countries. The compilation of EDMED was funded by the Marine Science and Technology Programme (MAST) of the European Commission and was co-ordinated by BODC.

As well as being available on the web (www.nbi.ac.uk/bodc/edmed.html) a floppy disk version is being developed - See BODC web site for more details.

Example of Information held on the UK Directory of Marine Environmental Data and EDMED

*DATASET-NAME: Common seal distribution and numbers in August (1988-1992)

*START-YEAR: 1988

*END-YEAR: 1992

*TIME-PERIOD: August 1988 to August 1992 (annual surveys)

*GEOGRAPHIC-COVERAGE: UK coast, especially Scotland and the Wash plus surrounds in England

*PROJECT: To assess the size status and distribution of seals in August

*PARAMETERS: seal population data, distribution and numbers from aerial surveys

*INSTRUMENTS: helicopter equipped with thermal imager, fixed wing aircraft with image motion compensation aerial camera

*SUMMARY: Seal population data is collected in late July and early August during the common seal annual moult. A helicopter is used to survey rocky haul-out sites as in the northern isles and all north and west Scotland coasts; a fixed-wing aircraft is used to survey haul-out sites on sandbanks as in the Wash. Data provide details of common and grey seal distribution and density during August. They also provide an estimate of the minimum size of the British Common seal population. Data are recorded on 1:50,000 Ordnance Survey maps and video tape and are held in a database at the Sea Mammal Research Unit, Cambridge. Certain stretches of coastline have been surveyed more than once and for these, mean figures are used. Data are supplied at three levels of detail: raw data with plotting accuracy to the nearest 100m square; data combined within 1km squares; data combined within 10km squares. Release of data should be restricted to the 10km square data set. Requests for more detailed information should be directed to A.R. Hilby or C.D. Duck at SMRU.

*REFERENCE: NERC News January 1992, 1993; SMRU Annual Reports 1990-1992

*STORAGE-MEDIUM: 1:50,000 Ordnance Survey maps, video tape and computer database

*AVAILABILITY: restricted

*HOLDING CENTRE: Sea Mammal Research Unit (SMRU)

*COMPLETED-BY: SMRU Personnel

*COLLATED-BY: BODC, Bidston

*ENTRY-DATE:21/11/1813

*REVISION-DATE:27/4/1993

*LOAD-DATE:20/6/1995

*MODIFY-DATE:7/11/1995

Appendix 5 UK Coastal Initiatives

The Forth Estuary Forum - The aims and objectives of this partnership are to “promote the wise and sustainable use of the Firth of Forth.”

Solway Firth Project - The aim of this project is to “develop in partnership with others a management strategy which will encourage current and future users of the Firth to set a level of social, economic and ecological development for the region that is compatible with the principles of sustainable development.”

Similar partnership projects have been initiated for the Tay, Clyde and The Minch but they are not at the same stage as the above.

The National Coasts and Estuaries Advisory Group (NCEAG) was initiated in 1991 and represents maritime local authorities in the UK. The aims of this group are to:

- Advice central and local government on policies and strategies appropriate to the sustainable development of coasts and estuaries in the UK
- Further the development of partnerships in coastal management between the statutory, advisory, business and voluntary sectors
- Gather and disseminate information on coastal and estuarial studies, plans, strategies and actions
- Initiate, animate and promote best practice in coastal planning management
- Liaise with similar organisations within the EU to exchange experience in coastal issues and management

NCEAG produces a quarterly newsletter Coastline UK and has an annual conference.

Esturiales - This is a cross European partnership of municipal and regional authorities covering five European Estuaries - the Clyde, Severn, Wear, Loire (France) and Tagus (Portugal). Their focus is on lessons to be learnt on sustainable management of these estuaries. They are aiming to shortly bring out a CD-Rom which will show best practice guidelines which have evolved from their experiences.

CoastNet - the Coastal Heritage Network was started in 1995 and aims to “link together individuals and organisations working for the sustainable management of the coastal and marine environment.” In doing this it hopes to improve the way in which the coast of the UK is managed and ensure that the practical experience of coastal managers and field staff contribute towards policy on the coastal zone.

As well as a regular bulletin and conference this group also have a very useful Web site (<http://www.poptel.org.uk/iac/coastnetuk/>). The site describes more about what they do and also has links to other coastal zone management web sites. One of the most useful linking Internet sites is the Coastal Management Web site (<http://wantree.com.au/~kays/index.html>).

Association for Geographic Information (AGI) Marine and Coastal Zone Management Special Interest Group - The aim of this group is to provide a UK forum for applications of GIS and related technologies in the marine and coastal zone environments. The group runs seminars and disseminates information via a web site on coastal zone GIS. See www.abdn.ac.uk/geography/agi/agicz.html for more information.

Appendix 6 GIS and related information systems in the Moray Firth

Organisation	GIS and related software products
Highland Council	ESRI software (Arc/Info, ArcView etc.) - Planning MapInfo - Roads Dept. ArcView, GGP & FastCAD - Property Dept.
Moray Council	ESRI software (Arc/Info, ArcView etc.) Smallworld - Roads Dept.
Aberdeenshire Council	GGP Smallworld
NOSWA	Smallworld
SEPA North	Plans underway to develop GIS resource - SEPA East already operate ESRI software.
HIE	Smallworld
SNH	ESRI software (Arc/Info, ArcView etc.) Intergraph Microstation - Cartographic Unit
SOAEFD	Paradox database, Surfer and IDRISI.
Aberdeen University	Various packages inc. ESRI software
Scottish Office	Arc/Info, Oracle, ArcView
Scottish Natural Heritage	Arc/Info, ArcView, ERDAS, Intergraph Microstation
Royal Commission on Ancient and Historic Monuments & Historic Scotland	Genasys, Oracle
Crown Estate Commission	Arc/Info, Oracle
Forestry Commission	Arc/Info, ArcView
Scottish Sports Council	MapInfo, Oracle
RSPB	MapInfo

Appendix 7 Access to Internet services within Moray Firth organisations and groups

Organisation	GIS System
Highland Council	Limited access to e-mail/www
Moray Council	Access to e-mail/www Intranet for internal use
Aberdeenshire Council	Access to e-mail/www
NOSWA	None currently
SEPA North	Access to e-mail/www - limited???
HIE	Access to e-mail/www??? Intranet for internal use???
SNH	No access currently
SOAEFD	Not known???
Aberdeen University	Access to e-mail/www
SOAEFD Marine Lab	Not known???
Organisations/Groups outside IRGTG	
Community Councils	???
Schools & colleges	Highland - all High Schools have access Moray - ??? Aberdeenshire - ???
Private households	approx. 5% of households in UK have Internet access
Public buildings eg. libraries	Limited

Appendix 8 Organisations providing public access to information over the Internet

Organisation	GIS System
Highland Council	None but planned for future
Moray Council	Access to web site and limited access to internal Intranet
Aberdeenshire Council	Not known???
NOSWA	Not known???
SEPA North	Access to SEPA Web site
HIE	Access to web site and limited access to internal Intranet
SNH	None but planned for future
SOAEFD	Not known???
Aberdeen University	Access to web site

Note that information content is not included and the intended use and audience of the information may be considerably different for each organisation.

Appendix 9 Common GIS file formats used for data exchange

Vector-based geographic data:

- Arc/Info export
- ArcView shape
- DXF CAD
- MapInfo MIF
- Intergraph DGN
- Ordnance Survey NTF

Raster-based graphical data:

- TIFF (Nb. TIFF format covers a range of standards which may not be compatible)
- GIF
- JPEG
- BMP

Miscellaneous attribute data:

- ASCII text files (comma, tab delimited)
- Excel spreadsheet compatible tables (xls, dbf etc.)

In general, polygon or area based datasets are most difficult to exchange between systems while lines are less so and points can be relatively easy. Extended attribute information held in external databases and linked to the GIS also pose significant problems particularly where the database design is highly 'normalised' and data resides in large numbers of linked tables. Where data export from relational databases is likely to be a common procedure, specific routines can be written to automate this, extracting the relevant information from different tables. It would also be worth considering a 'flatter' database structure where much of the information likely to be exported is held in a single table.

Appendix 10 Existing UK regulations on Access to Information

UK law relating to the protection and use of databases is found primarily in the body of copyright law (Copyright, Designs and Patents Act 1988), The Copyright and Rights in Databases Regulations (1997) and, to a lesser extent, the law on confidential information (Report of AGI Copyright Working Party 1993). Copyright can be applied where the composition passes a test of originality although the degree of originality is under considerable debate as copyright laws throughout Europe undergo a process of harmonisation.

The law of copyright and the consequent right to dictate terms on which protected material can be used enables suppliers to protect their work, prevent its misuse and make a return on their investment in compiling the information. Terms of use are specified through licence agreements and, where these are not followed, the licensee is liable for breach of contract, infringement of copyright and a misuse of confidential information.

Government agencies and local authorities are subject to further regulations¹:

Environmental Information Regulations 1992 (EIR). These regulations implement the EC Directive on Freedom of Access to Information on the Environment (90/313/EC);

Code of Practice on Access to Government Information. This code, which came into effect in April 1994, gives the public a right of access to information about "the policies, actions and decisions of Government departments, agencies and public bodies".

Data Protection Act 1984. This provides a legislative framework for the collection, storage and use of personal information held on computer files.

The storage and archiving of information held by public bodies is governed by the **Public Register and Records (Scotland) Act 1948.**

The EIR is of particular relevance to the MFP as it covers the following types of information:

- the state of water, air, soil, fauna, flora, land and natural sites;
- activities or measures which are likely to either adversely affect, or protect, the environment.

Within both the Code of Practice and the EIR there is a clear presumption in favour of release of information unless there are 'compelling and substantive' reasons for refusing. The valid grounds on which data can be withheld are given below.

EIR - Grounds for with-holding information:

- the request is manifestly unreasonable, or is formulated in too general a manner;
- the information is the subject of legal proceedings (including local and public inquiries, infraction proceedings, or judicial review);
- the information consists of confidential internal documents of the organisation;
- the information is unfinished work which will be published in due course;
- the information is personal data, or relates to the privacy of an individual;
- release of the information would harm the effective management or operations of the organisation;
- the information was given by another individual or organisation, where the information has been classed as "in confidence";
- the information was volunteered by individuals who were not obliged to do so;

¹ While the details of these regulations are considered to be accurate they are only intended to summarize relevant issues. Reference should be made to the respective documents for a complete description.

- the information contains commercially or industrial confidential information, or relates to intellectual property;
- the information cannot be separated from other information which cannot be released;
- release of information would in the circumstances increase the likelihood of damage to the environment.

The Code of Practice on Open Government - Grounds for with-holding information:

- defense, security, or international relations;
- internal discussion and advice;
- communications with the royal household;
- law enforcement and legal proceedings;
- immigration and nationality;
- effective management of the economy and taxes;
- effective management and operation of the public service;
- public employment, appointment and honours;
- voluminous or vexatious requests;
- premature release of information about to be published;
- individuals' privacy;
- third party commercial confidence;
- information given in confidence;
- statutory or other restrictions.

Where data is not released a clear explanation must be provided.

There would seem to be an apparent conflict between the EIR and the Tradeable Information Initiative (TII) which encourages government bodies to charge market rates for their information. However, it is suggested that since the EIR is the UK implementation of an EC Directive and, as such, it should clearly take precedence. Many organisations will charge a minimal fee in order to cover the costs of the data transaction process.

A recent **Charter Standard Statement on Geographic Information** by the Department of the Environment (1997) is aimed at all those for whom central government geographical information is an important part of their daily business including, for example, local authorities, private sector companies and researchers. It says that "Departments and agencies are encouraged to:

- Consult users when preparing specifications or drafting legislation for the collation of data;
- Provide information about what data are available;
- Provide clear statements on the price of data;
- Make data available, unless there are specific reasons for not doing so, in which case they must be explained;
- Ensure that data adhere to British, European and international standards and classifications;
- Deliver data in standard digital, or other, formats wherever possible;
- Supply accompanying documentation with data to enable users to judge the fitness for their purpose;
- Consult users before the destruction of any dataset;
- Publish a contact point to deal with enquiries;
- Provide information about how users can complain if they are not satisfied with the service they receive.

Many of these regulations will be affected by the forthcoming bill on Freedom of Information. Currently this is at the discussion stage and the summary document of the White Paper, Your Right to Know, is included in Appendix 11. Of particular note are the seven exemption clauses which allow information to be withheld. It is quite clear that unless information accords with these exceptions, there will be a presumption of openness. It is hoped that many of the conflicting regulations currently in practice will be harmonised by this forthcoming legislation.

Appendix 11 **Gouvernement White paper - Summary Document**

YOUR RIGHT TO KNOW

The Government's Proposals for a Freedom of Information Act

The Government has promised to introduce a Freedom of Information Act to end secrecy and increase openness. The Government sees this as a law which will give you the right to information held by the vast majority of public organisations. As a first step, the Government has published a White Paper - Your Right to Know - which sets out its proposals for a Freedom of Information Act. This leaflet describes what these proposals could mean for you.

What is freedom of information?

As proposed in the White Paper, a Freedom of Information Act would give everyone a legal right to see information held by national, regional and local government and some other organisations working on behalf of government. It would also mean that more information would be published as a matter of course. The aim is to open up public organisations and make the whole of government more accountable to people.

What public organisations would be covered?

It is proposed that Freedom of Information would apply right across the public sector at national, regional and local level. The Government would like the law to cover:

- government departments, for example Department of Health and Department for Education and Employment, and agencies, for example the Benefits Agency, the Employment Service
- local councils and local public bodies such as Registered Social Landlords and Training and Enterprise Councils
- quangos, nationalised industries and public corporations such as the Equal Opportunities Commission, and the Health and Safety Executive
- the National Health Service
- courts and tribunals
- the police and police authorities
- the armed forces
- schools, further education colleges and universities
- public service broadcasters such as the BBC and Channel 4

In addition it should cover:

- some private sector organisations carrying out duties on behalf of government
- privatised utilities.

What public organisations would not be covered?

Under the Government's proposals, the Security and Intelligence services would not be covered by the Act, nor would the Special Forces (SAS and SBS). This is because the Government believes they would not be able to carry out their operations effectively in the interests of the nation if they were subject to a Freedom of Information Act.

What sort of information would I be able to get?

The Government proposes to give everyone the right to see records or information held by the organisations listed above.

This would mean that you would have a right to see information held on you, such as your tax, social security, and medical records. You would also have the right to ask the organisations covered by the Act to give you other records or information about their day-to-day business that you might be

interested in. For example, more information about food safety, medical safety, pollution and other issues of public interest, would be available.

Would other people be able to get hold of information on me?

Your Right to Know sets out ways to help ensure that this wouldn't happen without your consent.

Is there any information I wouldn't be able to see?

Under the Government's proposals, information about sensitive security and intelligence matters, the personnel files of government employees, and information whose disclosure could undermine crime prevention or the bringing of prosecutions would not be covered under freedom of information law.

The intention is to make all other information available unless it would clearly cause harm to:

- national security, defence and international relations, for example, sensitive details about military capabilities
- the internal discussion of government policy
- law enforcement, for example information which would encourage tax evasion
- personal privacy - you would not be able to get hold of other people's personal records without their consent
- business activities such as trade secrets, or information which could unfairly damage a company's commercial standing
- the safety of individuals, the public and the environment, for example sensitive details about the breeding grounds of endangered species
- references, testimonials or other such matters given in confidence.

In addition any decision, whether to release or refuse information would need to satisfy certain basic tests - for example, is it lawful? - to ensure that it is consistent with the public interest.

In Your Right to Know the Government sets out detailed proposals on how these tests could be used to see whether information can be released.

Would organisations publish more information than before?

Yes. The Government would like to give you the right to ask for information. It would also like to see organisations publish more information as a matter of course. The Government proposes that:

- facts and analyses important in helping the Government to make major policy proposals or decisions should be published
- guidance on dealings with the public should be published
- reasons for government decisions should normally be made available to those affected by the decisions
- information should be published about how public services are run, such as costs, targets, performance and complaints procedures.

How would I be able to get hold of the information I'm interested in?

Under the proposed law, all you would have to do is write to the public organisation concerned. You may also be able to apply by telephone or E-mail.

Would I have to pay anything?

Under the Government's proposals, public organisations may charge a small fee to help cover administrative costs when you first made a request for information. The intention is that this should be no more than £10. If your request involved a lot of additional work, an organisation would be entitled to charge for some of the work involved. You would, however, be notified in advance of any charges, so that you could decide whether or not to continue with your request.

What if organisations won't give me the information I want?

The Government intends to appoint an independent and powerful Information Commissioner. If a public organisation refused to give you information and you disagreed with that decision, you would be able to appeal to the Information Commissioner. Appeals would be free and the Information Commissioner could order the organisation to release the information you had asked for.

The Information Commissioner would also be able to investigate complaints about delays in responding to a request and about excessive charges.

How can I find out more about the Freedom of Information Act?

The Government's proposals for a Freedom of Information Act are set out in the White Paper Your Right to Know: Freedom of Information.

What about my views on Freedom of Information?

Comments on any of the Government's proposals for a Freedom of Information Act are welcome. Please send your views by 28 February 1998 to:

Robert Cayzer
Freedom of Information Unit
Room 65d/1
Cabinet Office (Office of Public Service)
Horse Guards Road
London, SW1P 3AL

E-mail responses should be sent to foi@gtnet.gov.uk

We may wish to publish the responses we receive. If you would like your comments to be treated in confidence please make this clear.

What happens next?

Once we have received your views on Freedom of Information, the Government will prepare and publish a draft Bill next year. The Government will then listen to comments on the draft Bill. When the draft Bill is finalised the Government will seek to introduce it into Parliament as soon as there is an opportunity to do so. Subject to the views of Parliament, the Bill will become law in due course.

Freedom of Information Unit

[Machinery of Government and Standards Group Home Page](#)

Appendix 12 Types of coastal geographic information of general public interest

- Coastline
- Towns & villages
- Rivers
- Roads
- Partners within the MFP
- Best beaches
- Beach litter
- Water quality/bacteriology
- Water temperature
- Sewage outfalls
- Tidal information
- Tourism/visitor attractions eg. multi-media 'walkthrough' guide to tourist sites
- Nature reserves and local parks
- Wildlife sites and what could be seen throughout the year
- Camping/caravan/BBQ sites
- Car parks and access to foreshore points
- Outdoor recreation sites eg. golf, windsurfing, diving, walking
- Meteorology - rainfall/sunshine patterns
- Special events eg. Tall Ships Race, regattas
- 'Cool' places to visit
- Fishing villages and fish catch
- Electoral wards, local MPs, local council boundaries and Councillors.
- Industrial development zones
- Contaminated land
- Coastal defence sites
- Current news relating to the Moray Firth
- Historical information
- Archeological sites - land & marine

Appendix 13 Information Sharing

Information is now largely regarded by both commercial and public organisations as a valuable resource and one that can potentially be traded in the marketplace. However, there is also widespread acknowledgement that information sharing can reduce cost overheads, minimise duplication, encourage de facto standards and facilitate integrated management. Without information exchange coastal issues such as oil spill contingency planning or developing suitable coastal defence cannot be addressed adequately due to their geographical scale and cross-sector dependencies.

Legal Framework

Digital datasets are infinitely more flexible than their paper counterparts and their relative ease of duplication and incorporation into existing information systems has resulted in some confusion amongst users of the information on regulations which are ambiguous and, in some cases, conflicting. The main legal regulations and government guidelines affecting information are given in Appendices 10 and 11.

Information regulations affect both data collection and data dissemination. Unlike the US, there is not a culture of open access to information collected through public funds. Bilateral licence agreements are most common and provide a means of legalising an agreement between a single supplier and a single user. They inevitably include clauses prohibiting datasets being passed to third parties which considerably limits their use within the context of a partnership composed of a potentially infinite number of members. Multi-lateral Service Level Agreements (SLAs) have been set up by organisations like the Ordnance Survey (OS) to provide defined datasets at reduced rates for groups of organisations such as Local Authorities and government agencies. For example, there is currently an SLA set up which provides specific OS datasets to Scottish government agencies.

Establishing bi- or multi-lateral agreements between organisations is a time-consuming task involving detailed discussions at the corporate level and agreement from senior management. Frequently they attempt to set up a corporate wide strategy to encompass all types of non-sensitive information rather than specific datasets required for a particular purpose.

Information Transfer

The amount of data held on the Moray Firth in digital format is on the increase. Several organisations have recently procured GIS and are building comprehensive digital databases. However, incorporating data within a GIS can often be problematic even where it has been collected in digital form. For example, digitising of a Phase 1 habitat survey is a complicated process and if done incorrectly can lead to an inaccurate and misleading product within the GIS.

Likewise, transferring digital data from one information system to another can also pose substantial technical problems. Reasons for these difficulties include a lack of de facto standards for data exchange formats, complex graphical and non-graphical data models and structures, inappropriate scale or accuracy of the datasets or simply an absence of a digital data exchange network to allow effective transfer whenever necessary.

Experience has shown that, while rarely impossible, digital data transfer can impose serious cost overheads particularly where organisations do not see themselves as official data clearing-houses. It is hardly surprising that many organisations feel that time spent converting data into exchange formats is unprofitable and long-term licence agreements involving regular updates are an excessive burden.

It is hoped that developing de facto standards will ease many of these technical difficulties for data held within databases.

Information Standards

Within the field of Information Technology there are a multitude of standards managed at the international level by the International Standards Organisation (ISO). The British Standards Institute (BSI) is the body which agrees and publishes the international standards agreed by the ISO in Britain. A search on 'Information Technology' using the BSI electronic catalogue revealed 794 references to different standards ranging from defining user requirements to designing software interfaces.

The field of IT is in a constant state of rapid evolution. Competitive advantage has often been gained by companies maintaining a proprietary attitude which effectively ties users to their products and protects their intellectual property. However, recent trends within the computing marketplace (see Appendix 17) have seen a more collaborative approach by groups of companies targeting particular market sectors while other companies such as Microsoft have succeeded in setting de facto standards largely through sheer market dominance. Clearly users have much to gain from a more open environment where software packages present a familiar user interface and information can be exchanged effectively.

The more widespread applicability of geographic information together with the cost involved in its collection means that well defined standards both in terms of the information itself and the procedures which operate on that information are critical. However, the complexity of spatial information and the proprietary formats in which it is held frequently result in considerable transfer difficulties. Conversion routines are often time consuming and result in data loss and corruption. Version control becomes a serious problem in order to maintain consistency between the original and the converted dataset.

The BSI have published guidelines on the electronic transfer of geographic information (BS7567 Parts 1-3 and BS7666 Parts 1-4) although these are not widely used other than by the Ordnance Survey. De facto standards that currently operate within the context of the MFP are largely determined through levels of usage. Any formal standards that do exist determining, for example, data quality and frequency of updates are largely internal to suit organisational requirements. Many organisations are simply unaware of the existence of standards or fail to see their direct benefits. Metadata remains locked away in the minds of those who compiled datasets rather than collected, formalised and linked back to the dataset. The benefits of widespread information sharing are often under-estimated and universal communication channels are never opened.

Initiatives are underway to encourage industry standards and, to this end, the Association of Geographic Information (AGI) have recently published a report entitled 'Guidelines for Geographic Information Content and Quality'. At an international level EUROGI represents the EC geographic information community and is playing a catalytic role in the definition and implementation of standards. The ISO, through Technical Committee 211, is also currently coordinating a detailed programme into standards for underlying geographic data models, data administration and geospatial functions.

One of the most significant initiatives currently underway is that by the Open GIS Consortium (OGC) which is due to publish the Open Geodata Interoperability Specification (OGIS) later this year. This specification covers a much broader range of issues than those mentioned in above and is supported by all the leading GIS and database vendors.

The Open GIS Consortium was set up in 1994 to integrate geospatial data and geoprocessing resources into mainstream computing. It is currently attempting to define standards which will allow dissimilar GIS systems to communicate directly and ultimately facilitate the emergence of truly open, distributed and dynamic GIS applications.

The Open Geodata Interoperability Specification (OGIS) sets the standard that normalises the way in which client and server programs ask for, offer and accept geodata and geoprocessing resources. It also provides a model that establishes a common way for geodata objects to represent themselves.

For example, through the adoption of these standards it would be possible in the future to access GIS functionality through a Web browser on a standard PC at Moray Council, utilising GIS software on a server at Highland Council, and viewing overlapping images of recreation data held on a server at the Scottish Sports Council in one format with water quality data held on a server at SEPA in another format. Such an architecture would have the great advantage that data owners would retain control of their own datasets and the format in which they were presented to the user.

Such a scenario, of course, relies on information suppliers having access to dedicated, powerful servers which have file systems which are accessible to external organisations. Organisations which host the GIS software and supply information would have to be linked by high speed, broad-band networks while suitably trained personnel would be required to maintain the system. However, these technical considerations are fast becoming the norm. Perhaps more importantly, an open attitude to data sharing at the corporate level would be essential to provide the necessary resources for such a distributed information system.

OGIS is strongly supported by US federal agencies who are hoping to benefit from being able to buy software packages or separate software building blocks to match their specific requirements without worrying about data format interoperability. They want to be able to maintain data on servers and provide, for example, Java applets that will give anyone on any computer easy access to both their data and the software required to use the data. Within the Forth Estuary an EC funded project, E-MAIL, is currently working with Fife Council to apply these principles of integrating geographic information from different sources within a Web-based GIS package. This tool is able to combine datasets held on different servers in different formats and thus updates made locally by dataset owners will be reflected automatically in the view presented to the user. Thus it seeks to provide a truly dynamic approach to, in this case, the dissemination of environmental information (see GeoWise for further information on the EMAIL Project).

Standards for geographic information and GIS continue to be a subject for much debate and much useful information can be obtained from the Web sites of the AGI, EUROGI and OGC.

3.1.5 Economic and Political Issues

There is no doubt that some datasets are more politically sensitive than others and owners are less willing to see them distributed outwith their organisation. This may be due to commercial interests, confidentiality, legal liability for loss or damage resulting from use of the information, conflicting research or commercial objectives, or simply a reluctance due to the inevitable transfer of political power inherent with information exchange. Many data owners also feel that specialist datasets cannot be correctly interpreted by non-specialists and, indeed, could result in misleading conclusions. However, it is bad practice for datasets not to be fully documented and it is the responsibility of the dataset owners to ensure that sufficiently detailed documentation explaining the strengths and limitations of any dataset is produced.

These types of obstacles to open data exchange are much less easy to quantify and can present a frustrating barrier to effective data sharing.

Appendix 14 Coastal Management Issues related to Information Systems and Research

All issues have been derived from Topic Papers - authors comments in brackets.

Archaeology

- Visualisation of geographic datasets e.g. marine wrecks, marine dump sites etc.
- Identifying areas and potential areas of coastal erosion affecting archaeological sites
- Need for survey of sites and management of information returned (Nb. Some of this has already been collected by other organisations eg. Historic Scotland, SNH, Local Authorities)

Coastal Defence

- Visualisation of historic coastlines over last 50 years to illustrate accretion / erosion
- Gap in information on offshore winds, wave heights / periods and direction. No long term approach to collecting information on waves and currents in Moray Firth. Also decrease in funding for local meteorological data. (Potential to set up monitoring stations)
- Identification of coastal sections where there is risk of erosion or flooding. Currently there are no Local Authorities doing this.
- Funding for coastal mapping available from PESCA and possibly ERDF if matching funds can be identified.
- Zoning of coastal areas e.g. NPPG13 which attempts to classify coast as developed / under developed / remote. (However generally agreed that this zoning to define areas for future development is very simplistic and more sophisticated approaches should be found).
- Greater community involvement required accompanied by an increased awareness of issues.

Land Use

- To define area of influence applicable to land use within MFP
- To produce a baseline database of current and proposed land uses and relevant information - eg. integrate Local Authority structure and local plans.

Tourism

- Promotion of regions resources
- (In a recent article written by the Edinburgh & Lothian Tourist Board much is made of their use of a web site for promotion. "Research has shown a direct correlation between Internet users and frequent travellers. Interestingly the profile of browsers to the ELTB web site almost exactly matches visitor target markets and comprises 68% international browsers - the US accounting for the largest proportion of those".)

Natural Heritage

- Explore the potential for sustainable fisheries in the Moray Firth and the current level of adoption of the precautionary principle in Government fishery departments and planning/regulatory bodies.
- Carry out baseline surveys of MF shallow sub-tidal habitats and communities - urgently needed.

- Research required into the nature and extent of interactions between salmon and different predators.
- Research required into the effects of marine sand and gravel extraction on coastal landforms and marine wildlife.
- Research required into the effects of chronic oil pollution on birds and marine mammals. Also effects of heavy metals, PCBs etc.
- Improved monitoring to establish natural heritage baselines and indicators against which other impacts can be measured.
- Environmental Assessments should be carried out in all sensitive areas at risk from oil pollution. Studies also required into whether oil spill contingency plans are accurate.
- Maintenance of Firth-wide databases on coastal wildlife including mapped information on habitat distributions, monitors of coastal changes etc.
- Surveys required of low-tide counts of waders/wildfowl numbers in inter-tidal areas. Ensure councils are aware of the importance of inter-tidal areas when developing structure plans.
- Survey of Land/Sea interface found around the MF required together with what percentage of each is already subject to an artificial barrier. Assessment of which naturally occurring plant/animal species rely on this transitional zone or undisturbed passage across it.
- Impact of tourism and recreation on wildlife and habitats which, in turn, relies on baseline monitoring data on a site-by-site basis.
- Development of management strategies for minimising any potential impact of disturbance on marine mammals by boats. This involves identifying core mammal areas.
- Research project to gain a comprehensive picture of the historic situation in the MF. This should focus on key components of the natural marine system with a view to using the information to restore it to its optimal diversity and productivity.
- River catchment maps should be made available.
- Defining environmentally sensitive zones within the Cromarty
- SAC site management (currently being carried out by SNH).
- Marine and land areas covered by broad scale habitat mapping eg Phase 1 surveys, RoxAnn surveys
- Make information on designated areas and their implications more available to the public in an understandable form.
- Produce a Moray Firth model for marine ecosystem interactions
- Within the 'conservation vs. development' issue, address where the council is targeting development and where are the main conservation interests.
- Identification of existing and potential species that may require control, appropriate treatments and monitoring systems.
- Carry out research into use of Environmental Assessments in marine areas.
- Carry out a comprehensive survey of the problem of litter and other waste dumping - identifiable targets should be set for sections of the coast or types of waste.

- Communication of the natural heritage value to the people of the MF, particularly the idea of interdependence eg. quality of life, livelihoods, natural heritage. Develop a unity of purpose and enthusiasm within local communities to restore the diversity and productivity of the MF through co-operative action. Develop the idea of marine ecosystem restoration with local economic benefits and subsequent sustainable use. Suggested further research includes a broad based public perception study/questionnaire.
- Review sites and species suitable for wildlife tourism development.
- Encourage additional research activity.
- Review best practice methods for the development of sites for industry which also have positive impacts on wildlife.

Environmental quality

- Identify suitable geographical areas containing companies which could be targeted by Enterprise Agencies for waste reduction schemes
- Research into air pollution plume modelling
- Record spatial distribution of environmental ‘ monitoring stations’ (Use the MFP as a vehicle to promote a network of air, land and marine monitoring sites within the Moray and their respective roles - publish ‘network’ as map on web site, e.g. Monitoring the Moray Environment’ making it more accessible).
- Mapping of dredge and dump sites and potential areas of conflict with other uses e.g. entrance to Cromarty Firth.
- Mapping shipping / tanker channels and coastal destinations
- Identification of suitable areas for sludge disposal
- Research into discharge of ballast water (methods used elsewhere). Raise awareness of introduction of non-native species.
- Raise awareness of offshore decommissioning.
- Identify areas where water pollution from land use activities is most likely and target these areas e.g. arable, forestry etc. for integrated catchment management schemes. (Identify areas of potential conflict e.g. Forestry on specific soil types leading to likely pollution of nearby fish farms)
- Make records of beach bacteriology available to public

Sport & Recreation

- Information on recreational facilities associated with the firth tends to be unstructured or unrecorded, including facilities serving these areas. Needs to be co-ordination of scattered and single interest sources together with on-site sampling of casual recreation activities. Also need to know locations of key facilities eg. toilets, car parking, slipways etc. at popular sites eg Findhorn Bay. Facility locations could be used to assist Local Authorities in determining their priorities for developing facilities at key beaches.
- Needs to identify suitable areas for provision, where appropriate, of facilities for litter disposal and its removal.

- Database of recognised rights of way for walkers / cyclists and also foreshore ownership including crown/private boundaries, dangerous/no go areas, coastal erosion, availability of public access etc.
- Resolving the large number of minor and major conflicts - each problem or site often has to be addressed separately. Where consultation/education/harmonious integration is not working, then there may be a need for zoning approaches combined with education and awareness. This may involve identifying delimited areas which need to be backup up by local bylaw. Either that or promoting/redirecting one activity to another area where facilities may be more appropriate.
- Names of clubs and associations should be published to encourage codes of practice.
- MFP could provide safety and environmental information packs or provide notice boards in appropriate areas.
- Publish walking/cycling routes to promote sustainable transport
- MFP could develop closer links with the Countryside Ranger Service to jointly provide information interpretation and opportunities for environmental education. Likewise, other organisations eg. Rights of Way Society, Local Authority Planning Services, Moray Firth Community Access Strategy Project could come together to provide an information service in the local area.

General

- (Develop key coastal indicators on which to measure progress towards agreed aims. This should form the basis of a monitoring and review policy. Successful indicators are proposed in the DoE (1996) report.)
- (Visualisation of geographical information of public interest e.g. water quality, tides, beaches, visitor facilities.)

Appendix 15 The Resource Implications of developing an Internet link and web site

In terms of providing access to Internet services for the MFP Secretariat it is suggested that the level of usage would be sufficiently high to easily justify a dedicated on-line PC. This would be in line with current SNH policies on Internet access, notably that a standalone PC, unconnected to the SNH corporate network, would be required for Internet access. The PC would require a modem in order to be linked to the Internet via an existing telephone line.

The cost of a new mid-range PC capable of supporting standard office applications and including an internal modem would be approx. £1200. This would run Windows 95 which is currently not the corporate standard in SNH although, because the PC would not be connected to the corporate network, this should not present a problem. Ideally, it should have a dual-boot facility allowing the PC to boot into Windows 3.1 or Windows 95. Where a PC was already available, a separate external modem of appropriate specification costs approx. £100-£150. Access to the Internet offered by the major Internet Service Providers including all Internet services is currently £10-15 per month. In addition there is the cost of using the phone line while on-line. There would be considerable benefits to getting professional advice on the best type of Internet connection to suit the purposes of the MFP and to ensure that it is setup in the most appropriate way to manage its specific needs. A training element in the use of all Internet services (see 'Internet' in Glossary) would also be of use.

It is far from straightforward to estimate the likely cost of developing and maintaining a web presence without knowing the possible input from partners and the likely content of the site. The main overheads for developing a site which would be hosted on a computer, or server, of another organisation include:-

- Design, development and implementation costs of the web site - depend on the degree of sophistication of the site which, in turn, depends on its purpose.
- Maintenance and running costs - depend largely on the changeable nature of the site information and the importance of keeping the site up-to-date. These would largely be costs for time required by a Web specialist to carry out updates to the site.
- Leasing charges for use of space on a computer of another organisation - depend on the type of organisation and the benefits they may themselves gain from hosting a MFP web site in terms of promotion etc.

Design and development costs can vary from a few hundred pounds for a very basic site to hundreds of thousands of pounds for a large multi-media interactive site. Basic sites can be developed in hours by staff in a Cyber Cafe while more sophisticated sites are the domain of specialist Web developers. It is recommended that any Web developer has a full understanding of the information involved and the type of queries that visitors to the site will have. It is suggested that a minimum estimate for the cost of designing a site for the MFP would be £5000.

On the basis of the site requiring two major phases of update each year, each taking 2 weeks, this would incur further costs in the region of £2000 upwards depending on the nature of the changes.

To give an indication of leasing space server, Demon is currently charging approx. £400 pa for its corporate Diva package which includes 10-200Mb of server space, domain name registration (so the site address could be www.morayfirth.org.uk) and mail and web forwarding. It may be adequate certainly in the first instance to purchase less than 10Mb of space (sufficient for a series of web pages) and simply provide links to information on other web sites.

There would be considerable advantages to getting as much assistance at all stages from partners whether this is as an offer of space to host the site on their server or by providing technical advice on the design and layout of the site. Obviously there are attractions for local organisations who could gain promotional benefits from being associated with such a project. Likewise, there would be considerable benefits to the MFP where an organisation was able to offer access to an Internet mapping application allowing users browsing the web to view geographical datasets. This facility may be available within some organisations who can host the web site.

Appendix 16 Trends in the Information Society

Computing Architectures

The 1990s have been dubbed the decade of network computing. Certainly the benefits of more flexible computing architectures, the increasing openness of computing environments and widespread information exchange are being realised at both the intra- and inter-organisation level. The rapid growth rate of the Internet at 10% per month reflects the realisation by many organisations of the unquestionable benefits of local, national and international information exchange.

Distributed computing architectures, often termed client/server, are now the norm and offer greater flexibility in terms of building and maintaining computer systems. Many organisations have built hardware and software architectures based on the client/server model allowing different modules to be distributed on the computing platform (client or server) which is most suitable. This frequently results in corporate databases and network software being cited on powerful, dedicated servers where effective data management and security measures can be maintained. The front-end client tends to be the PC sitting locally on a users desktop.

For example, a user is running a GIS package loaded locally on their PC (the client) but linked to a corporate database on the office server. This represents a classic two-tier model. The user has a map on-screen of all SSSIs and would like to view a specific SSSI based on its name. Attributes of the map features such as 'SSSI name' and 'capture date' are stored on the server database. A query on the name of the SSSI is entered on their GIS. The GIS application sends a request to the server to 'select SSSI with name ... '. The database finds this record and returns the relevant information to the client. The GIS software uses this information to redraw the extent of the map on-screen to that of the SSSI and highlight the selection in a different colour. In this example, the power of the server has been utilised to select the single SSSI from the database of all SSSI records, while the graphics capability of the PC has been used to update the map on-screen.

There is a continuing discussion amongst computer manufacturers on the type of computers that are required on users desktops. The so-called 'thick client vs thin client' debate rests on whether a powerful and relatively costly PC is needed by the majority of users on their desktops. Thick clients, often high specification PCs, are packed with end-user capabilities and therefore minimise network traffic and demands on the server. Thin clients or Network Computers (NCs) are now being developed as the low cost alternative providing a more centralised architecture where servers carry out all data processing and file management tasks. Although NCs will have large memory capacities, their standalone capacities will be very limited. In the foreseeable future Information Technology managers may be looking towards such a strategy to reduce resource overheads and regain more control over the desktop environment.

Whether future clients are based on PCs or NCs, there is no question that high speed networks will continue to form the basis of all information technology strategies. Much of the existing network cables within organisations are coaxial copper cables and transmission can either be by analogue signals as with a phone line or digital as with an ISDN line. Increasingly, fibre optic cables are replacing traditional copper wire offering much higher digital transfer rates and, as a consequence, digital signals will predominate. For example, the key 'backbone' linking London and mainland Europe owned by LINX operates at rates in excess of 100 Mbps. Network linkages made through the transmission of radio waves both locally using antenna and over long distances using satellite communications are also likely to become more heavily used.

The Internet

The Internet is, of course, the largest global network supported by a range of computing platforms and reliant on many types of network cabling using both analogue and digital transfer modes. Many organisations now see the Internet as a means of inter-organisational linkage particularly through e-mail and file transfer utilities. Indirect internet connection through an Internet Service Provider can be provided either through the existing telephone network using a modem or through an ISDN line. Direct connection to the Internet can be provided through a leased line connection which, although very rapid, is only appropriate for very heavy Internet use due to its cost.

The facility which has done most to popularise the Internet is undoubtedly the World Wide Web. It provides a simple yet sophisticated means of viewing pages of text, pictures, video and sound through the use of a browser. Due to volumes of usage de facto standards of browsers have been dominated by two packages, Netscape and Microsoft Internet Explorer. Until relatively recently, uses of the Internet within the GIS field were confined to discussion groups, and promotional advertising through Web sites. However, the emergence of software development environments such as Java and Active X components have meant that sophisticated Web applications can be built which are platform independent. Interactive Web sites are now commonplace which build in on-line databases and allow the user to define queries and return selective information.

The Web also includes facilities to restrict access to specific addresses (URLs) or users. Data published on the Web can be made available to download in its raw form or, alternatively, users can be restricted to simply viewing the data and producing simple print-outs. It is also possible to implement charging mechanisms for information. This degree of flexibility with respect to information access means that a Web site can provide an ideal publishing mechanism for general information which is in the public domain and more sensitive information which should only be made available to specific organisations.

Over recent months almost every major GIS vendor has produced a Web-enabled GIS product to support internet and intranet mapping applications. The type of applications that have been developed include:-

- public information systems to:
 - provide city information on services and on-line forms
 - stimulate economic development
 - promote tourism
 - encourage community development
 - monitor traffic flows
 - publicise crime statistics
 - analyse voting trends
- publishing graphical metadata for data clearing-houses
- publishing information that is in the public domain
- providing 'locator' services such as 'where is the nearest...'

Examples of all these applications are listed in Appendix 17.

Organisational and political trends

Over the last decade there has been a gradually increasing recognition of the benefits of information sharing aided most recently by the dramatic growth of the Internet. In parallel with this has been a growing acceptance of the advantages of more integrated management strategies to overcome the sectoral bias organisational frameworks. This initiative is particularly the case in coastal areas where international, national and local organisations have endorsed the need for such an approach.

In government as in business, decisions continue to be pushed downwards resulting in larger numbers of decision-makers and an even greater need to ensure that suitable information is, quite literally, at their fingertips. To ensure that all interests are taken into account, this information should be drawn from a wide range of sources but presented to the user in seamless manner.

Finally, the political culture of access to information is gradually changing. In line with European guidelines, the UK government is currently working on a Freedom of Information Act encompassing central and local government and all government agencies. This is very unlikely to go as far as equivalent US regulations but will, nevertheless, promote a more positive attitude in favour of open access to public information. The current White Paper, published in December 1997, was put forward by David Clark, Chancellor for the Duchy of Lancaster entitled 'Your Right to Know'. The consultation period lasts until 28th February 1998. It does seek to force government departments into releasing information through the appointment of an independent commission (see www.open.gov.uk or email to foi@gtnet.gov.uk).

In the short term, clarification is being sought by European Commission on the apparent conflict between the Tradable Information Initiative and the Environmental Information Regulations with a view to encouraging a clearer government stance.

Appendix 17 Useful Internet Links

Discussion Groups

listserv@irlearn.bitnet	Coastal GIS
listserv@uriacc.bitnet	Biological conservation and GIS
listserv@irlearn.ucd.ie	Coastal GIS
listserv@ESRI.com	ESRI software
listserv@ubvm.bitnet/comp.infosystems.gis	General GIS

WWW Addresses

Coastal sites:

www.abdn.ac.uk/fef/index2.html	Forth Estuary Forum Site
www.poptel.org.uk/iac/coastnetuk	Coastnet UK
www.coastnet.com	Coastnet USA
www.npm.ac.uk/pml/LOISa.html	NERC LOIS Programme
www.npm.ac.uk/pml/lois/archive/AP/HUMBER	Humber Estuary Research - LOIS Programme
www.fmri.usf.edu/sori	Florida Marine Research Institute
mapindex.nos.noaa.gov	National Ocean Service Spatial Data Explorer
www.abdn.ac.uk/geography/agi/agicz.html	AGI GIS & Coastal Zone Management SIG
www.abdn.ac.uk/geography/mrm	Marine Resource Management
wantree.com.au/~kays/index.html	Coastal Management Web site

Information and Standards:

www.geo.ed.ac.uk/agi/agi.htm	Association for Geographic Information
www.geo.ed.ac.uk/agi/sig/enviro.htm	AGI environment Special Interest Group
www.opengis.org	Open GIS Consortium
www2.echo.lu/gi/en/gihome.html	EUROGI
www.ign.fr/megrin/gddd/gddd.html	GIS spatial metadata catalogue
www.idefix.geodan.nl	GIS spatial metadata catalogue

Public Information Systems:

www.ordsvy.gov.uk/services/sines/index.html	Metadata catalogue for UK government agencies
www.environment-agency.gov.uk	Environment Agency
www.isi.gov.uk	Information Society Initiative
www.foe.co.uk	Friends of the Earth
www.ordsvy.gov.uk	Ordnance Survey
www.geo.ed.ac.uk/quakes/quakes.html	Real-time GIS earthquake application
herman.tamu.edu/traffic.html	Real-time traffic flow map for Houston, Texas
www.ci.ontario.ca.us	Ontario City services
www.ci.berkeley.ca.us	Berkeley crime statistics and maps
www.pittsburgh.net	Pittsburgh tourist information
pen.ci.santa-monica.ca.us/pen/	Santa Monica Public Electronic Network
www.ci.sat.tx.us/edd/eddindex.html	San Antonio Economic Development Dept.

www.telport.com/~winchest/commun.html
www.election.co.uk
www.bristol.digitalcity.org
www.moray.org
www.tagish.co.uk
www.open.gov.uk
www.lgmb.gov.uk.im

www.bgs.ac.uk

Portland Community Development
UK voting trends
Bristol Digital City
Moray Council Web site
TAGISH - Listing of Info Initiatives etc.
Government Information Society Initiatives
Local Government Management Board -
developing the Information Society
British Geological Survey

Useful GIS Sites

www.usgs.gov

www.census.gov/geo/gis/faq-index.html

www.geo.ed.ac.uk/home/giswww.html

www.gisworld.com

General GIS information, publications etc

General interest GIS

General interest GIS

General interest GIS

REFERENCES

- AGI Report (1994). Copyright and geographic information Report of the AGI Copyright Working Party
- Arc News Spring (1993). Issue19(1) Managing South Florida's Extensive and Delicate Coastal Environment.
- Baker, P. (1993). Development of an environmental sensitivity atlas for Lake Superior's Canadian shoreline using electronic desktop mapping. *Proc. of the 16th Arctic and marine oil spill program technical seminar*. pp 225-255.
- Bartlett, D. (1990). Spatial data structures and coastal information systems. *Proc. of EGIS Conference*, Amsterdam
- Bartlett, D. (1993). GIS and the Coastal Zone: An annotated bibliography. *NCGIA Report* pp 93-99. Santa Barbara, CA.
- Copeland, J., Smith, C., Hale, S., August, P. Latimer, R. (1994). EPA program monitors US coastal Environments. *GIS World*, Aug. 1994 pp 44-77.
- Dickson, S. ESRI ARC News (Summer 1996). Using Technology to Manage a Shoreline. pp 9
- Davis, C. The process is as important as the product: an examination of the role of public participation in estuary management plan development in the UK. *Proceedings of the 15th International Conference of the Coastal Society*, Seattle USA 14-17th July 1996.
- Davis, C & Edwards S.D. Public participation in estuary management in England. *Proceedings of Coastal Zone '97: Charting the Future of Coastal Zone Management: The next 25 years*. Boston, USA 19-25th July 1997.
- DoE (1996) Coastal Zone Management - Towards Best Practice Oct 1996
- Fry, C., (1996). A new coastguard for the UK. *GIS Europe*, August 1996, pp.36-38.
- Green, D.R., (1994). Using GIS to construct and update an estuary information system. *Proc. of management technology in the coastal zone*. Centre for coastal zone management. Univ. of Portsmouth, October 1994 pp.129-162.
- Green, D.R., (1995) Internet and WWW browsers: the basis for a network-based GIS for coastal zone management. *Proc. of AGI '95*, Birmingham, UK pp5.1.1 - 5.1.12.
- Green, D.R., (1996) Between the desktop and the deep blue sea. *Mapping Awareness*, July 1996, pp 19-22.
- Green, D.R. & Ray, S. (1996) Development of a GIS for the Moray and its application to environmental management - Siting an Artificial Reef. (see author - Centre for Remote Sensing & Mapping Science, Dept. of Geography, University of Aberdeen).
- Groom, S., (1996). The NERC remote sensing data analysis service. *NERC News, summer 1996*, pp28-29
- Gundlach, E.R., Little, E.D., (1993). A portable GIS for spill response planning. *Proc. of the 16th Arctic and marine oil spill program technical seminar*. pp 541-551.
- Forth Estuary Forum - Topic Papers inc. Information & Research and Education & Awareness 1997.
- Franklin, F (1996) Development of a PC-based GIS for marine environmental impact assessment - MAFF Disposal at Sea Team. *Proc. of AGI MCZM SIG Managing UK Marine & Coastal Zone Environment*

- Friel, C. (1997). Meeting the demand for coastal geospatial data: Information delivery trends in Florida. *Proc. of Coastal Conference, Boston*.
- Harding-Hill, R. (1993). The Moray Firth Review SNH
- Harper, B, Curtis, M.(1993). Coastal Zone Mapping. *Mapping Awareness and GIS Europe* Vol. 7 Jan/Feb, 1993 pp 17-19.
- HR Wallingford (1996) Modelling pollution dispersal in the Firth of Tay. Personal communication.
- Ireland, P.(1994). Mapping out a Slick Response. *Mapping Awareness*, May 1994 pp30-33.
- Koh, A, Edwards, E. (1996). Integrating GPS data with fly on demand digital imagery for coastal zone management. *Papers of AGI Managing the UK Marine & Coastal Environment special interest group*, Manchester, July 1996.
- Krishnam, P.(1995). Research Report - A GIS for oil spill sensitivity mapping in the Shetland Isles. *Ocean and coastal management* Vol. 26 (3) pp247-255.
- Ligdas, N. (1996). A GIS application for the study of coastal processes in the NE of England. *Papers of AGI Managing the UK Marine & Coastal Environment special interest group*, Manchester, July 1996.
- Local Government Management Board 1997 Sustainable local communities for the 21st century.
- Local Government Management Board 1996b Innovations in Public Participation
- Local Government Management Board 1994 Community Participation in Local Agenda 21.
- McLean *et al.* (1996) The application of GIS within the flood defence function of the Environment Agency. *Proc. of AGI MCZM SIG Managing UK Marine & Coastal Zone Environment*
- McLusky, D. (Ed) The Estuaries of Central Scotland JNCC
- Moray Firth Partnership - all currently produced topic papers, draft of 'The Moray Firth: Management Issues & Opportunities' (1998)
- Nature Conservancy Council (1991). Nature conservation and estuaries in Great Britain.
- NCEAG (1994) Directory of Coastal Planning and Management Initiatives in England
- Nicholson, G. (1995) Neighbourhood base puts meaning back in planning. *Planning* 1105 10th Feb 1995
- Owens, E.H.(1994). Canadian coastal environments, shoreline processes and oil spill cleanup. *Environment Canada - Environmental protection series 3/88/5*, March 1994
- Raper, J., McCarthy, T. (1994). Using Aerial videography to access coastal evolution hazards. *Proc. European GIS conference '94*, Paris, France. pp.1224-1228.
- Ricketts, P.J. (1992). Current approaches in GIS for coastal management. *Marine Pollution Bulletin*, Canada, Vol 25 1-4 pp.82-87.
- Rickman *et al.* (1995). A categorised bibliography of coastal applications of geographic information systems. *University of Wisconsin Sea Grant Institute and Land Information and Computer Graphics Facility*.
- Roper, C. (1994). Hydrographic Office bids for world market admiralty raster chart service (ARCS). *Mapping Awareness*, June, 1994. pp36-38.

Sidaway R (ed) (1995). Development of a Community Involvement Policy for the Forth Estuary Forum. *Institute of Ecology and Resource Management, University of Edinburgh*

Scottish Office Development Department (1997) National Planning Policy Guideline NPPG 13 - Coastal Planning

Scottish Office (1995) Accessing Environmental Information In Scotland - A Research Report to the Scottish Office (John Moxen & Alistair McCulloch)

Solway Firth Draft Issues Paper.(1996). Unpublished

Stileman, M., Home, R. (1996). Applied GIS with shoreline management. *Papers of AGI Managing the UK Marine & Coastal Environment special interest group*, Manchester, July 1996.

Tye, D. (1994) Keeping the cost down in real public consultation. *Planning* 1087 23rd Sept. 1994.

Young, B. Knight, R.(1996). Baseline monitoring of habitat in Murlough and Dundrum bay area. *Papers of AGI Managing the UK Marine & Coastal Environment special interest group*, Manchester, July 1996.