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A biotope sensitivity database to underpin delivery of the Habitats Directive and Biodiversity Action Plan in the seas around England and Scotland

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This report has been prepared by the Marine Biological Association of the UK (MBA) as part of the work being undertaken in the Marine Life Information Network (*MarLIN*). The report is part of a contract placed by English Nature, additionally supported by Scottish Natural Heritage, to assist in the provision of sensitivity information to underpin the implementation of the Habitats Directive and the UK Biodiversity Action Plan. The views expressed in the report are not necessarily those of the funding bodies. Any errors or omissions contained in this report are the responsibility of the MBA.

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Foreword and acknowledgements

The *MarLIN* programme represents an important national initiative for the provision of quality controlled, scientifically based information for marine environmental management, protection and education to a wide and multi-disciplinary audience via the World Wide Web. The information is provided in a form that can support scientifically sound decision-making for marine environmental management and protection. *MarLIN* is a Web-based project so that it is not possible to do justice to the volume of work undertaken in this project, its resultant functionality or applicability, in a written report of this kind. The reader should refer to the *MarLIN* Web site (www.marlin.ac.uk) to appreciate the products of the contract.

The Biology and Sensitivity Key Information Sub-programme and the *MarLIN* Web site have involved input of time and effort from all members of the *MarLIN* team. The members of the *MarLIN* team responsible for the results of this contract were: Dr Keith Hiscock (Programme Director); Ali Hood (Communications & Liaison Officer); Dan Lear (Data Developer); Dr Harvey Tyler-Walters (Senior Data Researcher); Angus Jackson, Jacqueline Hill, Will Rayment and Georgina Budd (Data Researchers), and Jon Parr (Network Co-ordinator).

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The EN Nominated Officer (Dr Dan Laffoley) and representative of SNH (Dr John Baxter) have contributed to development and management of the project throughout. Collaboration with the JNCC Marine Information (now Marine Habitats) Team has been important in understanding the biotope classification and obtaining images to support the biotope key information reviews.

The Biology and Sensitivity Key Information Sub-programme has been improved by constructive criticism and additional information from outside experts who have kindly refereed many of our Key Information reviews. *MarLIN* is grateful for the input from all our referees, who are duly acknowledged on the relevant Key Information review Web pages.

In addition, the Key Information reviews and the *MarLIN* Web site as a whole have been greatly enhanced by the use of photographic images, which bring both marine species and biotopes 'alive' for the user. The *MarLIN* team would like to thank all our image providers for the permission to use their images on our Web site.

The *MarLIN* team are indebted to the members of the Biology and Sensitivity Key Information Sub-programme Management Group for their contribution to the development of the sensitivity scales and criteria, and the Sub-programme as a whole. We are also grateful to the members of the *MarLIN* Steering Group and our funders for their continued support and encouragement, without which the *MarLIN* programme would not be possible. Members of the Biology and Sensitivity Key Information Sub-programme Management Group, the Steering Group, and our funders are listed in the Annex to this report.

Executive summary

The development of a biotope sensitivity database to underpin delivery of the Habitats Directive and UK Biodiversity Action Plan in the seas around England and Scotland was commissioned in April 1999 by English Nature and Scottish Natural Heritage. The project was a natural extension to the work of the Biology and Sensitivity Key Information Sub-programme of *MarLIN* that had started to develop a systematic and scientific approach for the assessment of the sensitivity and recoverability of species in September 1998 under funding from the Department for Environment, Food and Rural Affairs (Defra).

The Biology and Sensitivity Key Information Sub-programme of *MarLIN* has developed a new approach to assessing the sensitivity and recoverability characteristics of seabed species and biotopes, together with tools to disseminate the information on the World Wide Web. The biotopes chosen for research in this project were important biotopes included in the interest features of Annex I habitats of the Habitats Directive or in the UK Biodiversity Action Plan.

At its conclusion in November 2002, the work carried out under this contract had:

- Developed protocols, criteria and structures for identifying 'sensitivity' and 'recoverability' of biotopes, which were agreed and tested by a programme management group.
- Developed a database to manage and interrogate biology and sensitivity key information, which contained information on 117 biotopes and over 420 species.
- Developed a user-friendly Web site to access information from the database, on the ecology, sensitivity and recoverability characteristics of over 117 biotopes, which in turn represented another 157 biotopes.
- Developed a user-friendly Web site to access information from the database, on the sensitivity and recoverability characteristics of over 149 species and basic information on over 280 species.
- Defined the link between human activities and the environmental factors likely to be affected by those activities.
- Developed on-line decision support tools to identify sensitive biotopes by Annex I habitat, Biodiversity Action Plan habitat, and the likely impacts of maritime activities.
- Developed a peer-reviewed approach to electronic publication of updateable information.

Environmental consultants and Government agencies are now using the information available on the *MarLIN* Web site.

This final report detailing the work undertaken and outlining the content of Web site has been delivered as a final product in addition to the Web site. A brochure describing the results of the contract has also been prepared. However, the results of the programme are best viewed on the *MarLIN* Web site (www.marlin.ac.uk).

1 Introduction to the project

The EU Habitats Directive and the Convention on Biological Diversity created turning points for marine conservation in the UK. The identification of Special Areas of Conservation (SACs) under the Habitats Directive resulted in many more marine protected areas requiring management than had existed previously, whilst criteria developed specifically for marine ecosystems identified habitats and species for action to protect marine biodiversity in UK waters under the UK Biodiversity Action Plan. One of the most important outcomes of these changes was the commitment to manage the UK's important marine habitats and species in a manner that led to populations and communities being maintained and, in some cases, restored over time.

The report *Safeguarding our Seas* (Defra 2002), the UK Governments first Marine Stewardship Report, has made improving our stewardship of the marine environmental a UK priority. This priority is important when marine resources are under increasing pressure and, in some cases, showing signs of stress. Increasing concern about marine ecosystems, in particular, stem from fishing, pollution, recreation, development pressures, introduced species and climate change. The Marine Stewardship Report promises to improve the use of marine science to underpin decisions on marine environmental protection and management.

Knowledge of the distribution of habitats, biotopes, and species and how they respond to the effects of human uses and activities is fundamental to better stewardship of the marine environment. The *MarLIN* programme was specifically developed to provide information on marine biotopes and species in support of the EU Habitats Directive, the UK Biodiversity Action Plan, and the management of our marine resources in a sustainable manner. *MarLIN* information is also needed to plan for the future, to develop new approaches to better stewardship such as those being developed for the Water Framework Directive and to concepts such as good ecological status for marine ecosystems, which are central to the development of the European Union marine strategy.

The *MarLIN* programme was developed to collate the best available scientific knowledge, from basic descriptions of where marine species and biotopes occur and what they look like, to much more detailed information on their ecology, and to further develop an approach to the assessment of their likely sensitivity to human activities and natural events. The *MarLIN* Web site was designed to disseminate the above information, freely, in a user-friendly manner, to decision-makers, environmental managers, and users of the marine environment.

In order to take a scientific approach to identifying the sensitivity of marine ecosystems to human activities and natural events, we need to use our knowledge in a structured, systematic and understandable way. The Biology and Sensitivity Key Information Sub-programme of *MarLIN* began developing such an approach in September 1998 under funding from the Department for Environment, Food and Rural Affairs (Defra). Further development of sensitivity assessment with respect to biotopes began in April 1999 with funding from English Nature (EN) and Scottish Natural Heritage (SNH).

This report outlines the objectives, tasks and deliverables of EN Contract No FST 20-18-05, jointly funded by EN and SNH, undertaken by the Marine Life Information Network (*MarLIN*) at the Marine Biological Association of the UK (MBA) in Plymouth. Information on the development of the *MarLIN* approach to species and biotope sensitivity assessment, the biology and sensitivity database and the *MarLIN* Web site have been discussed in detail in previous reports (Hiscock *et al.* 1999; Lear 1999; Tyler-Walters & Jackson 1999, and Tyler-Walters *et al.* 2001).

Relevant information on the biotope sensitivity assessment rationale and the *MarLIN* Web site has been summarized in the following report. Key terms and their definitions are given in Box 1.

Box 1 Key terms and their definitions

'Biotope' the physical 'habitat' with its biological 'community'; a term which refers to the combination of the physical environment (habitat) and its distinctive assemblage of conspicuous species. For practical reasons of interpretation of terms used in directives, statutes and conventions, 'biotope' is sometimes synonymized with 'habitat'.

'Biotope complex' groups of biotopes with similar overall character (for example seagrass beds, rockpools, or dense fucoids).

'Community' refers to a group of organisms occurring in a particular environment, presumably interacting with each other and with the environment, and identifiable by means of ecological survey from other groups. The community is usually considered the biotic element of a biotope.

'Habitat' the place in which a plant or animal lives. It is defined for the marine environment according to geographical location, physiographic features and the physical and chemical environment (including salinity, wave exposure, strength of tidal streams, geology, biological zone, substratum), 'features' (such as crevices, overhangs, or rockpools) and 'modifiers' (for example sand-scour, wave-surge, or substratum mobility).

'Factor' (environmental) a component of the physical, chemical, ecological or human environment that may be influenced by natural events or anthropogenic activity. For example, temperature, salinity or water flow rate.

'Sensitivity' is the intolerance of a habitat, community or species to damage, or death, from an external factor. Sensitivity must be assessed relative to change in a specific factor.

'Recoverability' is the ability of a habitat, community or species to return to a state close to that which existed before the activity or event caused change.

2 Aims and objectives

The aim of the project was defined in the contract as:

Create a specific relational computer database application, with information accessible on the World Wide Web and via CD-ROM, to supply quality assured information on the sensitivity of particular biotope complexes, biotopes and species in order to support implementation of the Habitats Directive and the UK Biodiversity Action Plan in the seas around England and Scotland.

The information was to be presented in a user-friendly manner to support management decisions by site managers and statutory agencies.

The overall aim gave rise to the following specific objectives.

Objective 1. The Biology and Sensitivity Key Information database will:

i) include the biotope complexes, biotopes and species that are of importance under the Habitats Directive and Biodiversity Action Plan in England and Scotland;

ii) provide a framework that will enable the systematic collection and prioritization of information on relative sensitivity, using a coarse scale for categories of relative sensitivity, operations and their underlying processes;

iii) build on work undertaken by English Nature's Maritime Team and Scottish Natural Heritage's Maritime Group to provide an initial view of relative sensitivity as part of the agencies statutory duty to provide advice to relevant authorities;

iv) build upon work undertaken by the JNCC Marine Information Team, which has prepared an initial series of habitat reviews and their sensitivity, and

v) be linked to the MNCR biotopes classification.

Objective 2. The user 'front-end' of the database will:

vi) be interpreted as information accessible on the World Wide Web and CD-ROM;

vii) contain only the essential data fields required to derive, quantify where appropriate (if required), and support the determination of relative sensitivities of species and biotopes; and

viii) be presented in a highly user-friendly manner, developed and tailored to the needs of site advisors and managers.

The project was required to build on, and be fully compatible with, relevant work and data standards already underway under a Defra contract 'Identifying species and ecosystems sensitivities' (Contract No CW0826) (see Tyler-Walters *et al.* 2001). At the beginning of the EN contract, work under the Defra contract had begun to define key terms and criteria for sensitivity assessment, developed a species sensitivity assessment rationale, a database to hold species key information and Web pages to disseminate information. Work undertaken in the Defra project would, therefore, shape and affect the delivery of products under this contract. In the same way, it was anticipated that experience from the work being undertaken on biotopes, particularly on coarse sensitivity scales and assessing sensitivity of biotope complexes, would provide similar feedback into the core Biology and Sensitivity Key Information Sub-programme funded by Defra.

In practical terms, the work on behalf of English Nature and Scottish Natural Heritage complemented many of the activities within the Defra project and as such was intended to mesh seamlessly with the broader Defra project by using a common database system and sharing many common data fields.

3 Timetable

The project required a phased development, beginning with identifying sensitivity criteria and the assessment rationale for biotopes, followed by development of the biotope database, Web pages to disseminate the information and finally by population of the database with information reviews. Therefore, the project was divided into four phases:

Phase I: Set-up (April 1999 to June 1999)

1. Recruit staff.
2. Install equipment and software.

Phase II: Agreeing sensitivity rationale, data fields and features to be covered (June 1999 to September 1999).

1. Complete sensitivity assessment rationale for species.
2. Develop sensitivity assessment rationale for biotopes.
3. Link sensitivity assessment to factors and operations (activities).
4. Agree Key Information fields for species.

5. Develop and agree Key Information fields for biotopes.
6. Identify a priority list of biotopes divided into four tranches for data entry.

Phase III: Functional development and testing of database and user-friendly 'front end' (September 1999 to May 2000).

1. Complete sensitivity assessment rationale for biotopes.
2. Develop and agree Key Information fields for biotopes.
3. Agree a priority list of biotopes divided into four tranches for data entry.
4. Input trial biotopes data to calibrate data entry, test the database and the Web-based front end.
5. Develop a relational database to hold and search biotope Key Information.
6. Develop 'user-friendly' Web based front end (*demonstration*).
7. Demonstration version of Web version on-line for trial and comment.
8. Demonstration of searches and queries on-line.
9. Interface with MERMAID (MIT, JNCC) established.

Phase IV: Filling the database with information (May 2000 to March 2002).

1. Biotope tranche 1 (May 2000 to October 2000).
2. Biotope tranche 2 (October 2000 to May 2001).
3. Biotope tranche 3 (May 2001 to August 2001).
4. Biotope tranche 4 (August 2001 to January 2002).

The project involved close liaison and regular meetings with the EN Nominated officer (Dan Laffoley) and representative of SNH (John Baxter). The scientific criteria, Key Information fields and sensitivity assessment rationale were developed by the *MarLIN* team in consultation with the Biology and Sensitivity Key Information Sub-programme Technical Management Group and ratified by the *MarLIN* programme Steering Group, both of which include representatives of the major users of marine information, statutory agencies, regulators, and marine research institutes (see Annex). The development of the important deliverables is discussed in more detail in the following sections.

The project built on the approaches and data standards developed under the Defra-funded project (Tyler-Walters *et al.* 2001). The latter stages of the contracts run concurrently. However, many of the species key information reviews used in subsequent biotope research were prepared under the Defra contract.

The project proceeded on schedule until May 2001 during completion of Biotope tranche 2. At this point, it became clear that the biotope research was taking longer than the original calibration exercise had suggested (see Section 8). The biotopes chosen to trial the sensitivity assessment rationale were easier and less time consuming to research than many of the biotopes scheduled for research in Phase IV.

In order to resolve the issue, the *MarLIN* team adopted strict writing procedural guidelines (see Appendix 1) and revisited the number of species reviews that had originally been planned as part of the biotope research. The revised Tranche 2, 3 and 4 biotope groups were agreed with the Nominated Officers (Dan Laffoley and John Baxter) in September 2001. After revision, each biotope review was expected to take between three and five days work, plus the time taken to research any key structural, key functional or important characterizing species,

and consequently, there was not enough time in the contract to complete the proposed tranches. Therefore, an extension to the contract was granted in September 2001, so that all four biotope tranches could be completed. The revised deadlines in Phase IV were:

- Biotope tranche 2 by October 2001.
- Biotope tranche 3 by April 2002
- Biotope tranche 4 by October 2002.

It was agreed that one month after each completion deadline was required for quality control before each tranche was placed on-line.

4 Key information

4.1 Introduction

The biology and sensitivity reviews target the essential data or 'Key Information' required to inform environmental management and protection, and required to assess the sensitivity and recoverability of a species or biotope to environmental perturbation. The 'Key Information' fields, expected to be researched and summarized, were initially discussed at the Newcastle species recording workshop in February 1998 (Foster-Smith 1998). They have since been used to produce 'Key Information' reviews as a background to Species Action Plans (UK Biodiversity Action Plan) and for the Oslo and Paris Convention for the Protection of the Marine Environment of the North-east Atlantic (OSPAR) IMPACT meeting in September 1998. Some of the testing and calibration of effort required had therefore already been carried out when project staff came into post.

Significant changes were made to the species Key Information fields following meetings of the Biology and Sensitivity Key Information Technical Management Group of *MarLIN* in November 1998 and March 1999 and following a sensitivity workshop held in Bangor in January 1999. From extensive testing and experience of actual data entry, further slight modifications were made by September 1999.

The biotope Key Information fields were designed to be compatible with the marine habitat reviews initially developed for the OSPAR IMPACT (now Biodiversity Committee) working group meeting in September 1998 and further developed for the UK marine SACs Project (Jones *et al.* 2000). The biotope Key Information fields were finalized in December 1999, after considerable discussion with the Marine Information Team at English Nature and representatives of Scottish Natural Heritage and trial data entry of ten biotope Key Information reviews.

The procedure for data entry is outlined in the Section 5 and is based on the rationale and user guide (Tyler-Walters & Jackson 1999). Key Information is entered to a Microsoft Access database (see Section 6), which has a wide range of facilities for accessing scales and presenting information.

4.2 Design of the Key Information fields

The Key Information fields were chosen to target scientific data and information to produce Key Information reviews of species and biotopes. The design of the Key Information fields and hence the Key Information reviews adopted the following guiding principles:

- the Key Information reviews are designed to support environmental management and protection;

- the reviews are not designed to be complete scientific monographs on the species or biotope concerned;
- the reviews target the 'Key Information' required to assess the sensitivity and recoverability of a species or biotope to environmental perturbation;
- the reviews are based on available scientific information, collated by the *MarLIN* team using the resources of the National Marine Biological Library at Plymouth;
- the reviews use defined categories ('Key Information' fields, words or terms with associated on-line glossaries) to produce concise, targeted information;
- although concise and key worded, the quality and accuracy of the information is paramount;
- all references made in the text are entered in short format and the full reference is displayed on the Web site via a pop-up browser window or in the on-line bibliography;
- the Key Information reviews are made available to a wide audience through the World Wide Web and, therefore, they are designed to be viewed on the Web site, and
- all specific terms used in the Key Information reviews are defined in pop-up glossaries, while additional scientific terms are defined in an on-line general glossary.

The Key Information reviews were designed to be read by a wide audience, including environmental managers, nature conservation agency staff, marine scientists, and members of the public. Therefore, the writing style was kept accurate but concise with technical terms avoided or easily accessed in on-line glossaries. A full glossary of scientific terms was also provided on-line. A complete list of the glossaries used or developed within the *MarLIN* programme are presented in Tyler-Walters *et al.* (2001) and available on the *MarLIN* Web site.

Not all of the Key Information fields were completely applicable to all species or biotopes and the facility to enter 'Not relevant' was included.

'Additional information' was added where aspects of a species or biotopes ecology did not fit neatly within the defined categories. 'Additional information' is also used to clarify material where the standard categories used did not indicate fully relevant information, or to add Key Information that would be omitted otherwise.

It was anticipated that there would be little information for many of the species and biotopes reviewed under the contract, especially nationally rare and scarce species or biotopes. Therefore, the facility to enter 'No information found', 'Data deficient', or 'Insufficient information' was also included.

4.3 Species Key Information fields

The species Key Information fields were finalized in September 1999. Only slight modifications to their presentation as Web pages and glossaries were made after that date.

The species Key Information fields addressed the following main subject areas:

- basic information;
- taxonomy and identification;
- general biology (adult and larval/juvenile);
- habitat preferences and distribution;

- reproduction and longevity;
- sensitivity and recoverability, and
- marine natural heritage importance.

A complete list of the species Key Information fields is given in Tyler-Walters *et al.* (2001; Appendix 9).

4.4 Biotope Key Information fields

The draft version of the Key Information fields for the biotope database was modified considerably and was finalized in December 1999. Only slight modification to their presentation as Web pages and glossaries were made after that date.

The biotope Key Information fields addressed the following main subject areas:

- basic information;
- biotope classification;
- ecological relationships;
- seasonal and longer term changes;
- habitat complexity;
- productivity;
- recruitment processes;
- time for community to reach maturity;
- habitat preferences and distribution;
- species composition;
- sensitivity and recoverability, and
- marine natural heritage importance.

The complete list of the biotope Key Information fields is given in Appendix 2.

5 Sensitivity assessment rationale for species and biotopes

5.1 Introduction

The *MarLIN* approach to sensitivity assessment built on a review of the strengths and weaknesses of existing approaches to sensitivity assessment, especially earlier work by Holt *et al.* (1995, 1997), which thought through many of the concepts of vulnerability, sensitivity and recoverability. Studies commissioned or undertaken by the nature conservation agencies in the UK, the ICES Benthos Working Group workshops and meetings of the OSPAR IMPACT group, together with subsequent development by *MarLIN*, all contributed to the standard criteria and scales.

The sensitivity assessment rationale was developed by the *MarLIN* team in consultation with the Biology and Sensitivity Key Information Sub-programme Technical Management Group and ratified by the *MarLIN* programme Steering Group.

Definitions of the terms 'sensitivity' and 'recoverability' are shown in Box 1. A summary of the *MarLIN* approach to sensitivity assessment follows.

5.2 Assessing the sensitivity and recoverability of biotopes

The *MarLIN* approach to the assessment of the sensitivity and recoverability of biotopes assumes that the sensitivity of a community within a biotope is dependent upon and, therefore, indicated by the sensitivity of the species within that community. The species that

indicate the sensitivity of a biotope are identified as those species that significantly influence the ecology of that component community. The loss of one or more of these species would result in changes in the community of associated species and their interactions. The criteria used to identify species that indicate biotope sensitivity subdivide species into 'key' and 'important' based on the likely magnitude of the resultant change.

The biotope sensitivity assessment rationale used to assess biotope sensitivity includes the following steps.

i). Review Key Information for the biotope. The best available scientific information required to describe the ecology and likely sensitivity of the biotope is collated using the resources of the World Wide Web, National Marine Biological Library (NMBL) and the expertise of marine biologists based at the MBA, Plymouth. The Key Information included in the biotope Web pages is outlined in Section 4 above.

ii). Select species indicative of biotope sensitivity. Species are selected based on the review of the ecology of the biotope and community, where direct evidence of community interaction or dependency is available, or where they are 'important characterizing' species (see Box 2.)

iii). Review Key Information for the selected species. Key information on the biology and sensitivity of the indicative species is researched.

iv). Indicate quality of available data. The *MarLIN* programme operates an internal quality assurance procedure, to ensure only the most accurate available information is provided on-line. The quality of the available evidence and our confidence in our assessments (based on availability of information) is clearly stated.

v). Assess the sensitivity and recoverability of indicative species to environmental factors. The sensitivity of the indicative species is assessed with respect to change in 24 separate environmental factors. Precedence is given to direct evidence of effect or impact. In the absence of direct evidence, the *MarLIN* rationale includes simple decision trees to aid sensitivity and recoverability assessment based on the available information. The decision trees provide a systematic and transparent approach to sensitivity assessment and are described fully by Tyler-Walters *et al.* (2001).

vi). Assess overall sensitivity and recoverability of the biotope. The sensitivity of the biotope is derived mainly from the sensitivity of the species identified as indicative of sensitivity, using a simple decision tree. Knowledge of the biology of other species in the biotope, especially if they have been researched as a part of the *MarLIN* programme, is also taken into account. Precedence is given to direct evidence of the effect of change in environmental factors or human impacts on the biotope or community.

vii). Assess the likely effect of the environmental factors on species richness. Change in an environmental factor may not significantly damage key or important species but may still degrade the integrity of the biotope due to loss of species richness. Therefore, the likely effect of the factor on species richness in the biotope is indicated.

viii). Signing-off. *MarLIN* reviews are checked by the Programme Director for accuracy and clarity, and changes are made before the review goes 'on-line' on the Web site.

ix). Referee. As a final stage in the *MarLIN* quality assurance, Key Information reviews are subject to peer review by an external marine biologist where possible.

Box 2 Species indicative of biotope sensitivity

Key structural: the species provides a distinct habitat that supports an associated community. Loss/degradation of the population of this species would result in loss/degradation of the biotope.

Key functional: the species maintains community structure and function through interactions with other members of that community (for example, predation, grazing, and competition). Loss/degradation of the population of this species would result in rapid, cascading changes in the biotope.

Important characterizing: the species is/are characteristic of the biotope and are important for the classification of the biotope. Loss/degradation of populations of these species would result in loss of that biotope.

Important structural: the species positively interacts with the key or characteristic species and is important for their viability. Loss/degradation of these species would likely reduce the viability of the key or characterizing species. For example, these species may prey on parasites, epiphytes or disease organisms of the key or characteristic species.

Important functional: the species is/are the dominant source of organic matter or primary production within the ecosystem. Loss/ degradation of these species could result in changes in the community function and structure.

Important other: additional species that do not fall under the above criteria but where present knowledge of the ecology of the community suggests they may affect the sensitivity of the community.

The sensitivity of a biotope to change in each environmental factor is assessed against a standard 'benchmark' level of effect, which allows the user to compare the recorded sensitivity with the level of effect predicted to be caused by a proposed development or activity. The evidence and information used to assess sensitivity and any judgements made are explained in the on-line rationale for each assessment. The source of all information used is clearly referenced on-line.

The *MarLIN* sensitivity assessment rationale, definitions of terms, sensitivity and recoverability scales, benchmarks, and decision-trees are described in detail by Tyler-Walters *et al.* (2001) and included on the *MarLIN* Web site (www.marlin.ac.uk), to which the reader should refer for further information.

6 The Biology and Sensitivity Key Information database

6.1 Development of the database

Microsoft Access was chosen as the database to provide the backbone of the *MarLIN* Biology and Sensitivity Key Information Sub-programme and the *MarLIN* Web site. The database holds the information that is used to generate the Key Information Web pages and runs users queries, the results of which are displayed on the Web site. Microsoft Access is widely used within the scientific community and in Web development.

Microsoft Access:

- is 'relational' in structure (links between fields, with dynamically updateable data);
- is accessible through the Internet;

- permits data entry and manipulation via the Internet;
- allows complex query formation, based on existing data;
- is compatible with other data systems currently in development, such as those within JNCC and the countryside agencies (for example the MNCR database and the Marine Conservation Society /Ulster Museum Species Directory);
- provides sufficient security for the data held within it;
- allows data to be readily imported and exported from it, and
- has sufficient capacity for all the data accumulated during the project.

A 'relational' database structure allows large amounts of data or information to be stored while minimizing the memory required and, therefore, increasing the speed with which the information can be queried and retrieved. In addition, it is extensively programmable, which allows greater customisation and tailoring of the package to the exact needs of the Sub-programme (Lear 1999; Tyler-Walters *et al.* 2001).

The *MarLIN* Biology and Sensitivity database was designed to hold the Key Information fields for both species and biotopes. However, the species and biotopes sections were kept separate within the database and used different data entry forms. In addition, a separate database was designed to manage the library of marine life images displayed on the Web site.

The structure and function of the database was rigorously tested and improved over a lengthy period during Phase II and III of the project, involving the trial data entry of Key Information for 19 species and ten biotopes and their conversion into Web pages (see Section 7). Minor changes and improvements were made throughout the contract period in response to comments received from users, data researchers and the Biology and Sensitivity Key Information Sub-programme Management Group.

6.2 The Biotope Key Information database

6.2.1 Introduction

The Biology and Sensitivity database holds the information in the form of tables. The information is entered using intuitive, easy to use, custom made, data entry forms. A separate data entry form was provided for each subject area of the biotope key information. Key Information is entered directly in the database fields via the data entry forms. An example of the biotope data entry form is shown in Figure 1.

6.2.2 Data entry and data integrity

The database was designed to be easy to use and to ensure that data entry was rapid. This was achieved by the use of:

- 'drop-down' boxes of standard terms;
- 'multi-select' boxes of standard terms, and
- 'pop-up' glossaries of standard terms and definitions.

The 'pop-up' glossaries ensured that data researchers had the *MarLIN* scales and criteria at hand during data entry and used the standard terminology correctly.

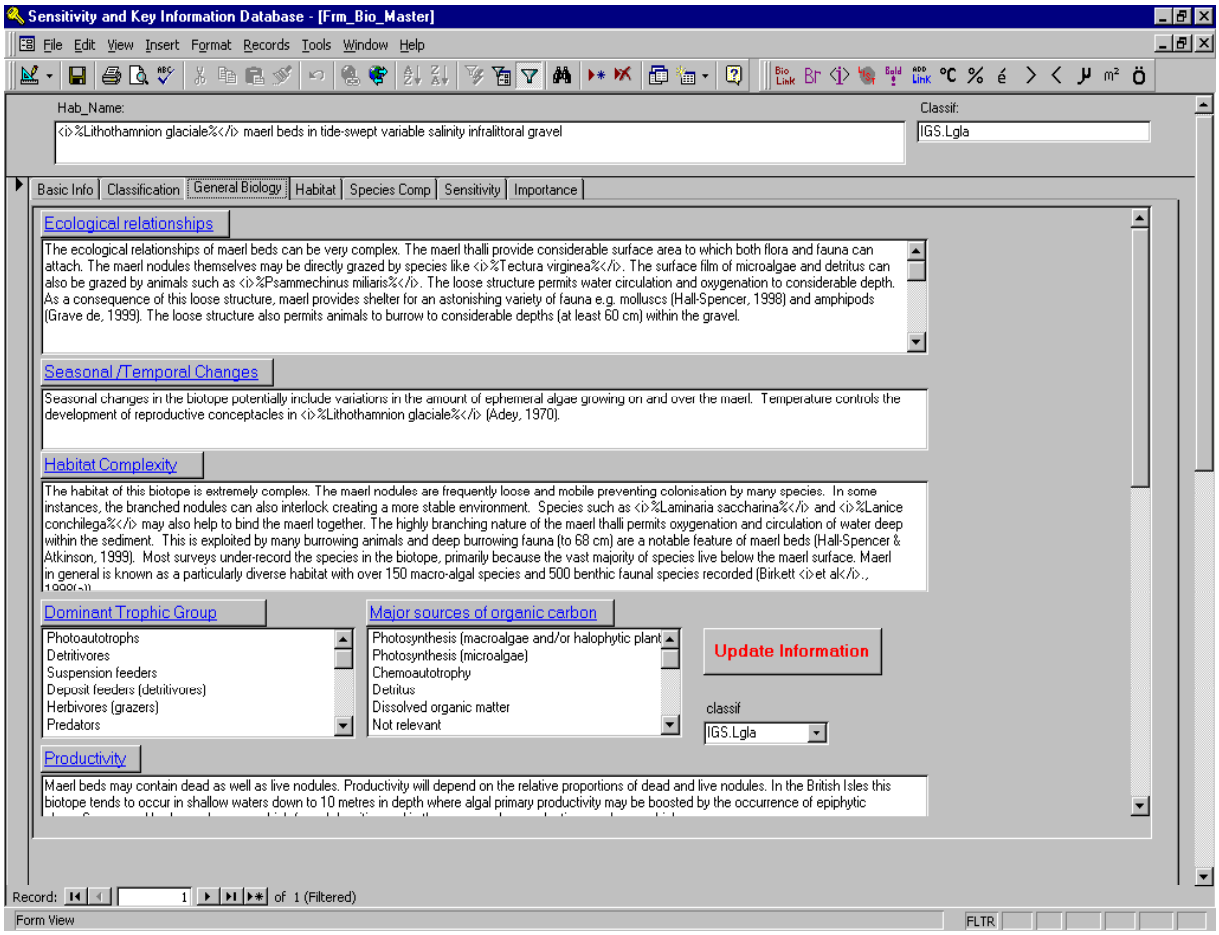

Figure 1 Data entry fields for the general biology of a biotope

Where appropriate, 'validation-rules' were incorporated to ensure that the correct type of information was entered into the appropriate fields. The 'drop-down' boxes and 'multi-select' lists ensured that possible typing errors were avoided and maintained data integrity.

The database was programmed (using 'macros') to allow:

- the addition of special characters;
- italicisation and emboldening;
- the insertion of bulleted and numbered lists, and
- species names or biotope codes to be hyper-linked in the text.

Wherever possible the fields were completed automatically from standard dictionaries. The biotope section of the database contains the MNCR Biotope dictionary (based on Connor *et al.* 1997 a, b), which automatically completes the biotope code, name, description and classification.

6.2.3 Data security

As with any computer system, it is vital to ensure the security of both the information held and the hardware itself. The Biology and Sensitivity database and associated Web site were backed up to a digital tape and CD-ROM on a weekly basis. The Web site itself was protected through the inherent security systems within the Windows NT Server operating system. This prevents and avoids malicious or accidental deletion or alteration of the data

held by *MarLIN*. The database was secured through a simple user recognition and password scheme, only available to the *MarLIN* team.

The full database will not be sent to outside experts. Outside experts invited to complete Key Information reviews receive a blank database that only contains the database structure, Key Information fields, and standard terms.

6.3 The user interface

6.3.1 Introduction

The *MarLIN* Web site was used as the user interface. This required that the information held in the Biology and Sensitivity database was available and could be interrogated remotely (queried) via the Web site. Furthermore, the Web site allowed the information gathered to be interpreted and used by decision makers, as specified in contract Objective 2. The above requirements were achieved using a mixture of 'static' and 'dynamic' Web pages.

The majority of the Web pages on the Web site are static; that is, they are stand-alone documents presented on the World Wide Web. Static pages can be readily updated using a Web page editing tool such as Microsoft FrontPage or Visual InterDev.

The Biology and Sensitivity Key Information reviews are relatively long documents. Given the large number of reviews that were researched during the contract it was not advisable to create these Web pages dynamically. This would put a considerable strain on the Web server and database, resulting in slow response and connection times. Therefore, a transcribing process was established.

The Biology and Sensitivity Key Information Web pages were produced by custom written Visual Basic (VB) software. The software transcribes the Key Information in the database into a standard HTML template for each species and biotope. The VB software also enables the Key Information review Web pages to be updated on a regular basis, or in the light of comments received.

6.3.2 Dynamic searches and interrogation

Dynamic Web pages are created in response to an information request by a remote user. When the user interrogates the system to retrieve information, a complex chain of events occurs.

i) The users Web browser submits the query to the Web server based at *MarLIN*.

ii) The Web server accepts the query from the users browser, creates a connection to the Biology and Sensitivity database and queries the database.

iii) The Web server formats the results of the query into HTML and delivers the resultant HTML to the requesting browser.

iv) The users Web browser displays the results of the query remotely.

The database server is responsible for accepting requests from the Web server and delivering them back to the Web server (Lear 1999). In this approach, the Web server acts as the client to the database server and no connection is directly made between the users browser and the database server. This is important when considering data security and related 'permissions' to the database server (Johnson 1997).

MarLIN has predominantly adopted Active Server Page (ASP) software to interface the Biology and Sensitivity database and the Web site (Lear 1999). This technique was used to create the functionality of the *MarLIN* Web site (see Section 7).

7 The Marine Life Information Network (*MarLIN*) Web site

7.1 Introduction

The *MarLIN* Web site has provided the main platform for the promotion and dissemination of the *MarLIN* programme, including the Biology and Sensitivity Key Information Sub programme since going on-line in January 1999. The first few biotope Key Information reviews went on-line in September 2000. The following section outlines the content and functionality of the 'Habitat (Biotope) Information' section of the *MarLIN* Web site. However, it is not possible to detail every aspect of the Web site here, especially its functionality. Therefore, this report should be read in conjunction with the on-line version of the Web site (www.marlin.ac.uk).

The contents of the Biotope Key Information Web pages are outlined below. The design and development of the *MarLIN* Web site and the Biology and Sensitivity Key Information review Web pages for both species and biotopes are discussed in detail by Tyler-Walters *et al.* (2001).

CD-enabled copies of the *MarLIN* Web site were produced as deliverables during the contract period to demonstrate progress. However, all the Web pages prepared under the EN and Defra contracts together with the other Web pages prepared by the *MarLIN* programme, and on-line searches and queries can be found on the *MarLIN* Web site. The full functionality of the Web site can only be viewed through the Web site itself and cannot be emulated by a CD-ROM version. Therefore, no 'final' CD-ROM has been prepared. The final products of the contract are hosted by the *MarLIN* Web site.

The *MarLIN* Web site was designed, in part, to achieve Objective 2 of the contract, namely to:

i) be interpreted as information accessible on the World Wide Web and CD-ROM;

ii) contain only the essential data fields required to derive, quantify where appropriate (if required), and support the determination of relative sensitivities of species and biotopes, and

iii) be presented in a highly user-friendly manner, developed and tailored to the needs of site advisors and managers.

A user-friendly Web site was designed using the following guiding principles. The Web site should be:

- simple and clear;
- fast, and
- useable by non-specialists, unfamiliar with either specific terminology or computer programs.

The Web site was designed to accommodate a wide user group from academic institutions with access to 'state of the art' Internet facilities to members of the general public with home computer systems and land line (modem based) connections to the Internet. The speed with which Web pages load is crucial for those users without the luxury of time and those users without access to Ethernet or ISDN lines.

The Web site has gone through several iterations to improve its appearance and functionality. The Web site was developed in collaboration with, and in the light of comments received from, the Biology and Sensitivity Key Information Sub-programme Management Group, the *MarLIN* Steering Group, statutory agencies such as the Joint Nature Conservation Committee, English Nature and Scottish Natural Heritage, and external referees.

7.2 Biology & Sensitivity Key Information pages

7.2.1 General features

The Key Information Web pages were designed to present the agreed Key Information fields (Appendix 2) in a simple, easy-to-use manner. The Key Information fields present a large amount of information in a concise manner. However, the following features ensure that users are not overwhelmed with information or technical jargon:

- Basic Information pages are provided;
- full 'Key Information' pages are subdivided and arranged into 'layers' of increasing detail;
- all scientific or technical terms are explained in 'pop-up', on-line glossaries;
- all *MarLIN* specific terminology and criteria are explained in 'pop-up', on-line glossaries;
- the rationale or explanations behind each sensitivity and recoverability assessment are available on-line, and
- support material, such as the standard benchmarks, the 'activities to factors' matrix, references and bibliography are available on-line.

In addition, the following features are included:

- distribution maps;
- marine life images, and
- the ability to hyperlink from the Key Information pages to other species or biotopes within the Biology and Sensitivity database or to Web based searches.

The species or biotope information pages are accessed via the decision support tools (searches) or via a simple browseable list.

7.2.2 Subdivision and layout of the Key Information pages

The Key Information reviews are subdivided into the sections identified in the Key Information fields (Appendix 2). Each section of the Key Information review is presented on a separate Web page.

It was important that the presentation of the information as a 'front end' was as user-friendly as possible. The information is targeted at a wide audience, including, nature conservation agency staff, professional researchers, and environmental managers. The subdivision of what is a large amount of information ensures that the user views only the information that they require. This 'layered' approach ensures that the user can select the information they require at the level of detail they require.

The Basic Information page is the first page that the user opens for biotopes. Each other section of the Key Information review Web pages is accessible via a navigation bar at the top of each page.

An outline of the Biotope Key Information pages is shown in Figure 2. All Key Information reviews prepared during the present contract can be viewed on the *MarLIN* Web site.

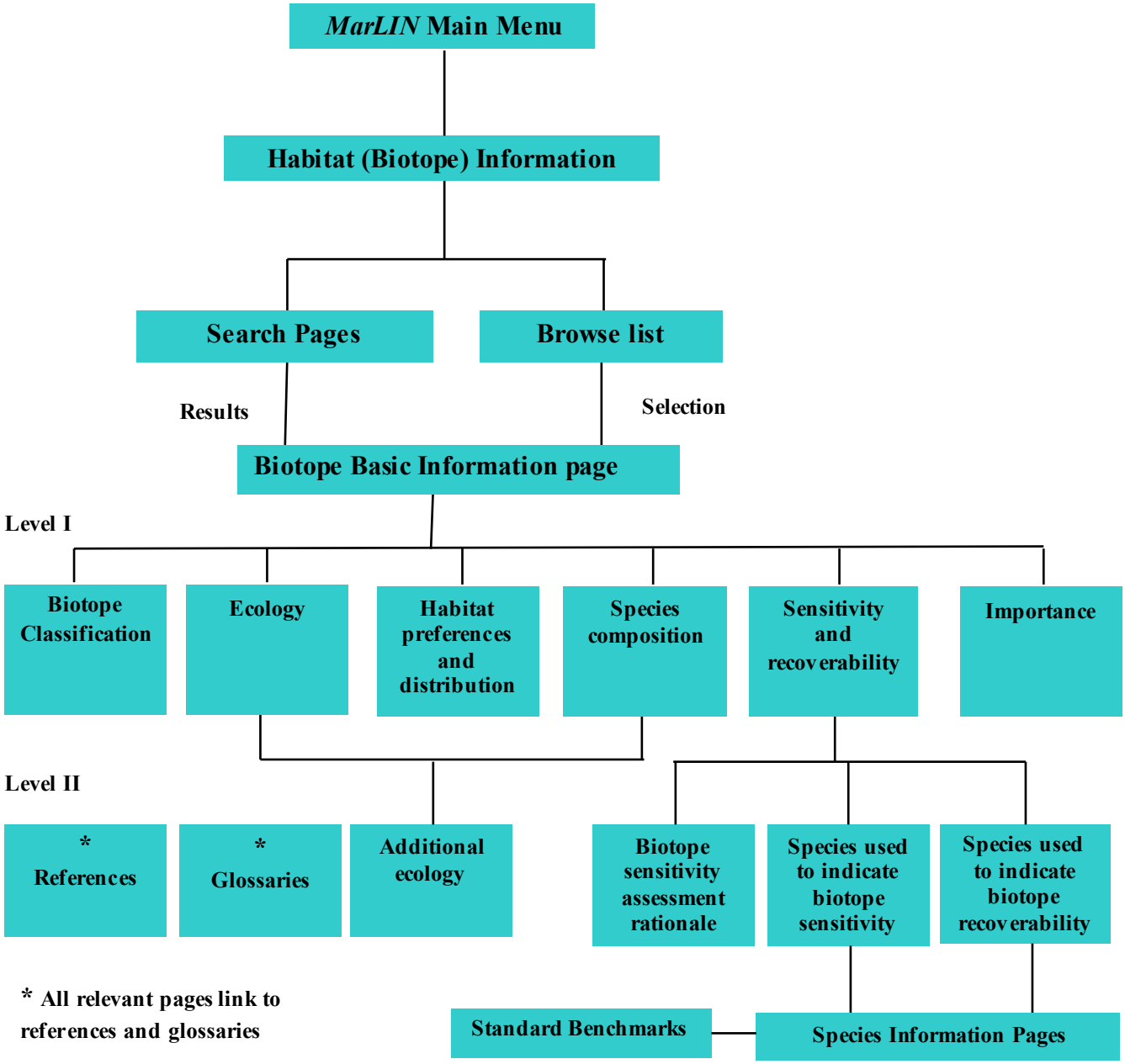

Figure 2 Outline of the Biotope Key Information Web pages

7.2.3 Distribution maps and marine life images

Simple distribution maps for each species or biotope are presented on-line. Wherever possible a photographic image of the species or biotope is included. The maps and images can be viewed at full size.

7.2.4 Glossaries

All terms and definitions, together with scientific terminology are defined in on-line, 'pop-up' glossaries. The use of on-line glossaries of scientific terms ensures that the Key Information reviews can be interpreted by non-biologists.

7.2.5 Bibliography

All the references researched and entered into the Biology and Sensitivity database are included in an on-line bibliography. The bibliography contained approximately 3200

scientific papers, reports, and books by November 2002. The biotope bibliography can be searched by habitat complex and biotope name, while the species bibliography can be searched by phylum and species name.

7.2.6 Sensitivity and recoverability

The sensitivity and recoverability assessments are presented in the form of a matrix of assessments against each environmental factor. The evidence / confidence level for each assessment is indicated on the matrix. The assessments are colour coded for easy reference.

7.2.7 Rationale and explanatory text

It was essential that the *MarLIN* approach to sensitivity and recoverability assessment was transparent and clearly explained. The scientific basis for *MarLIN*'s sensitivity and recoverability assessments had to be obvious so that users (such as environmental managers and environmental impact assessors) could compare *MarLIN*'s assessments with their activities or impacts of interest. How the sensitivity assessments that were derived had to be clearly explained to avoid ambiguity, misinterpretation or misuse.

Therefore, all terms and definitions are clearly defined in 'pop-up' on-line glossaries. The rationale behind the sensitivity assessment for each environmental factors and species or biotope is also available on-line and linked to the standard benchmarks used in the assessment. Any background or explanatory text concerning the rationale, standard benchmarks, and the 'activities to factors' matrix are available online.

7.2.8 Web page 'interconnectivity'

The ability to hyperlink Web pages both within the *MarLIN* site and to related Web sites provides a truly interactive information resource. The first mention of any species name in the biotope Key Information reviews pages are converted to hyperlinks, which link within the *MarLIN* Web site to basic information or full Key Information reviews. Where no *MarLIN* species information is available, the hyperlink directs the user to a 'Google' search for the species. 'Google' (www.google.com) is a highly efficient and recommended World Wide Web search engine.

Similarly, all first mentions of biotope codes within the text are also converted to hyperlinks, and link to relevant biotope Key Information reviews on the *MarLIN* Web site or to the Marine Environmental Resource Mapping and Information Database (MERMAID) Web site.

7.3 Decision support tools

7.3.1 Introduction

The information provided by the Biology and Sensitivity Key Information reviews supports decision-making for environmental management and protection. The Key Information reviews can be incorporated into the decision-making process and is especially valuable in answering the 'will it matter if?' question from the point-of-view of conservation of marine biodiversity.

In addition to the information provided in the species and biotope pages, it is possible to interrogate the Biology and Sensitivity database directly. This was achieved in two ways:

- the selection of 'generic' information requests, for example 'list all of the species or biotopes in the database covered by Biodiversity Action Plans', and
- the creation of user-defined queries 'on the fly', for example 'list all of the species in the database that are highly sensitive to changes in oxygenation'.

Therefore, the following search tools have been provided on the Web site:

- search for species by phylum species name, or common name;
- search for species by keywords in the species description;
- search for species listed under UK legislation and international conventions;
- search for biotopes by biotope code and keywords in the biotope description;
- search for biotopes by species name;
- search for biotopes listed under UK legislation and international conventions;
- search for biotopes included in Annex I habitats of the Habitats Directive, and
- search for species or biotopes sensitive to specified maritime activities.

The search tools interrogate the database on-line and produce dynamic Web pages using custom-written ASP scripts.

7.3.2 Identifying biotopes included in interest features of the Annex I habitats of the Habitats Directive

A search for biotopes included in the interest features of Annex I habitats is provided on the site. This search is based on a list of biotopes associated with the Annex I habitats of the EC Habitats Directive provided by the Marine Habitats Team at JNCC (Brazier & Connor 1999).

7.3.3 Assessing sensitivity to specified maritime activities or natural events.

The sensitivity of marine species or biotopes is assessed with respect to changes in environmental factors. However, coastal and environmental managers, within nature conservation agencies, local government, or industry, are concerned primarily with the management, control, or operation of activities. Therefore, an 'activities to factors' matrix was developed to indicate those environmental factors that were likely to change due to specified maritime and coastal activities (see Tyler-Walters *et al.* 2001).

The 'activities to factors' matrix was derived from the Marine Conservation Handbook (Eno 1991) as amended by Cooke & McMath (2000) and discussion with the Marine Habitats Team (JNCC), and the Biology and Sensitivity Key Information Sub-programme Technical Management Group. The list of maritime and coastal activities developed within the *MarLIN* programme should not be regarded as definitive or exhaustive. A comprehensive list would be too long to be practicable. Therefore, many of the activities listed represent classes or groups of activities. Each of the activities shown in the matrix and the types of activity that they are used to represent in Britain and Ireland are clearly defined. The definitions of maritime activities and the 'activities to factors' matrix are discussed by Tyler-Walters *et al.* (2001) and are available on the *MarLIN* Web site.

Wherever possible the list of activities and environmental factors was in agreement with the guidance provided on marine candidate SACs by English Nature, under Regulation 33 of the 'The Conservation (Natural Habitats, &c.) Regulations 1994' (SI 1994/2716), and further guidance provided by Joint Nature Conservation Committee to OSPAR.

The 'activities to factors' matrix was developed to form a search for species or biotopes sensitive to specific maritime activities. The 'activities to factors' matrix is duplicated within the Biology and Sensitivity database.

The search tool allows the user to select a specific maritime activity (such as scallop dredging). The 'activities to factors' matrix is interrogated within the database to produce a

list of environmental factors that are likely to change as a result of the specified activity. The user then selects one environmental factor from the list and the database returns a list of species or biotopes that have been assessed as sensitive (high, intermediate or low) to that environmental factor. The results are presented as a dynamic Web page in the users browser.

8 Undertaking the research

8.1 Introduction

The reviews are based on available scientific information, collated by the *MarLIN* team using the resources of the National Marine Biological Library, based at the Marine Biological Association at Plymouth. The present guidelines for data researchers are shown in Appendix 1. Guidance notes for referees and the quality control procedures are provided by Tyler-Walters *et al.* (2001).

The following standards were adopted:

- the Marine Conservation Society/Ulster Museum Species Directory (Howson & Picton 1997) was adopted as the standard taxonomic checklist;
- the MNCR biotope classification (Connor *et al.* 1997 a, b) was adopted as the standard list of biotopes;
- the Journal of the Marine Biological Association of the United Kingdom style for citations and references was adopted, and
- the ISO 690-2 Standard for electronic publication citation was adopted for World Wide Web information resources.

Key Information research relied on straightforward library and World Wide Web searches but was greatly aided by advice from relevant experts as to sources of academic data. The Key Information reviews were often greatly enhanced by feedback from our referees, especially the species reviews.

8.2 Priority and representative biotopes

The MNCR biotope classification (Connor *et al.* 1997 a, b) identifies over 270 separate biotopes, 370 if sub-biotopes are included. Therefore, it was obvious that not all of the biotopes listed by Connor *et al.* (1997 a, b) could be completed within the time available for the contract. Hence, priority was given to important biotope complexes, biotopes and species included in the interest features of Annex I habitats of the Habitats Directive, or within the UK Biodiversity Action Plan of the seas around England and Scotland.

A preliminary list of 203 priority biotopes was provided by EN and SNH at the beginning of the contract. But it was recognized that researching each biotope separately was not possible in the time available and probably not necessary.

Therefore, in order to produce an achievable list of biotopes for research, a sub-set of 120 biotopes was identified by the *MarLIN* team to 'represent' the sensitivity of other biotopes. A biotope was chosen as 'representative' of one or more other biotopes if the 'representative' biotope:

- occurred in similar habitats;
- was populated by similar functional groups of organisms, and
- was populated by the same (or functionally similar) species indicative of sensitivity as the biotope(s) they were chosen to represent.

The 'representative' biotopes were researched as single entities. The biotope(s) represented by the researched biotope are shown on the Biotope Key Information Web pages (see Section 7). A complete list of the biotopes researched and the biotopes they were used to represent is given in Appendix 3.

8.3 Biotope Key Information research

8.3.1 Species indicative of sensitivity

The biotope sensitivity assessment rationale assumes that the overall sensitivity of a biotope is dependent on the sensitivity of its component or associated species. Not all characterizing species contribute to the sensitivity of a biotope or community (see Tyler-Walters & Jackson 1999 and Tyler-Walters *et al.* 2001 for discussion). In addition, it would be impractical to undertake Key Information research for all the species within a biotope. Therefore, species indicative of sensitivity are identified as part of the biotope sensitivity rationale (see Section 5; Tyler-Walters *et al.* 2001). A complete list of the species used to indicate biotope sensitivity is given is Appendix 4.

In the majority of cases, several species indicative of sensitivity were identified, and researched together with the biotope Key Information. The species Key Information reviews researched to support the biotope Key Information research made a valuable contribution to *MarLIN*'s work for Defra (see Tyler-Walters *et al.* 2001).

As research progressed, a large number of species that were key structural, key functional or characterizing of major marine habitats or biotopes or that were examples of the major groups of marine species around Britain and Ireland were completed. For example, kelps, fucoids, foliose red algae, calcareous or encrusting red algae, barnacles, gastropods (including limpets), mussels, crustaceans, sea urchins, starfish, soft corals, sponges, bryozoans, ascidians and gobies. The representative, characteristic and key species researched by *MarLIN* during the lifetime of the contract are shown in Appendix 5.

In a small number of cases, no additional species research was carried out for a biotope, usually because there was inadequate information on the species required to complete a full Key Information review. In which case, basic information alone was prepared and relevant information of the biology or ecology of the species included in the biotope Key Information review. A biotope Key Information review was prepared based on the biotope as a whole, for the biotope complexes LMS.MS and LMU.Sm (see Appendix 3) because the biotope complexes encompassed several different biotopes and it was inappropriate to identify species indicative of sensitivity. In a minority of cases no species research was carried out because of time constraints (see below) but the relevant available information was written into the biotope Key Information review. For example, full species Key Information reviews of the common reed *Phragmites australis* and common saltmarsh grass *Potamogeton pectinatus* were not prepared for their relevant biotopes (IMU.NVC S4 and IMU.NVC A12 respectively) since the relevant literature was extensive and outside the expertise of the *MarLIN* team.

8.3.2 Time constraints

As a result of the problems described in Section 3.2, writing focused on Key Information only relevant to the ecology and sensitivity the biotope and time limits were set on the review of the literature. In addition, fewer characterizing species were researched than originally intended at the beginning of the contract. As a result, the content and detail of several reviews were reduced. Nevertheless, the biotope Key Information reviews became increasingly focused documents and any reduction in quality of the final product was kept to an absolute minimum.

8.3.3 Key Information review status

The Key Information reviews are subject to internal quality control procedures (see Tyler-Walters *et al.* 2001). Reviews are prepared by the data research staff and edited by Dr Keith Hiscock, Programme Director before they are corrected and placed on-line. The Programme Directors' Key Information reviews are edited by the Senior Data Researcher. Key Information reviews are placed on-line in this 'draft' form, ready to be sent to one and occasionally two referees. The Web pages clearly state that 'This information is not refereed'. Reviews are then updated in light of the referees' comments. The referee is identified on the final version of the Key Information review.

The review 'status' in the Appendices indicates the reviews' stage in the quality control procedures as described below.

- 'Signed-off and on-line' - the review has been edited by Dr Hiscock (or Dr Tyler-Walters), the comments addressed, and the draft review has been placed on-line.
- 'With referee' - the signed-off review has been sent to a referee.
- 'Refereed' - referees comments have been received, acknowledged and filed but not yet addressed.
- 'Refereed and updated' - the referees changes and comments have been addressed, checked, and the referees name indicated on the revised, final on-line copy.

8.3.4 Revision of the biotope classification

In early 2002, the Marine Information Team at JNCC released several consultation drafts of the revision of the MNCR biotope classification. The revision of the classification resulted in changes to the biotope codes, their descriptions, and lists of characterizing species. However, the revised biotope classification was unlikely to be ratified until after the end of the contract. *MarLIN* will endeavour to include the revised biotope classification and a look up to its present reviews in the 'Habitat (Biotope) Information' section of the Web site as part of the on-going maintenance and upkeep of the Web site.

It became apparent that several of the biotopes included for research in Phase IV of the contract were going to be discontinued in the revised biotope classification. Therefore, after discussion with the Nominated officers, the following biotopes were omitted from Phase IV:

- LR.Rkp.H - Hydroids, ephemeral seaweeds and *Littorina littorea* in shallow eulittoral mixed substrata pools;
- LMX.Mare - *Mya arenaria* and polychaetes in muddy gravel shores;
- IMS.FaMS.SpiSpi - *Spio filicornis* and *Spiophanes bombyx* infralittoral clean or muddy sand;
- SIR.K.EchBriCC - *Echinus*, brittlestars and coralline crusts on grazed infralittoral rock;
- SIR.K.LsacRS.FiR - Sparse *Laminaria saccharina* with dense filamentous red seaweeds, sponges and *Balanus crenatus* on tide-swept variable salinity infralittoral rock, and
- LGS.Est.Ol - Oligochaetes in reduced or low salinity gravel or coarse sand shores.

The biotope LGS.Est.Ol was moved to be represented by LGS.Aeur - Burrowing amphipods and *Eurydice pulchra* in well-drained clean sand shores, while SIR.K.EchBriCC was replaced

by research on the biotope MIR.Lhyp.Gz - Grazed *Laminaria hyperborea* with coralline crusts on infralittoral rock.

9 Summary of work completed

9.1 Biotopes and species researched

At the end of the contract in November 2002, all of the contracted biotopes were completed, signed-off and on-line. A total of 117 biotope Key Information reviews were researched and were available on-line at the end of the contract and are listed in Appendix 6. The biotopes researched were used to represent an additional 157 biotopes (Appendix 3).

The biotopes researched include important biotope complexes and biotopes included in the interest features of Annex I habitats of the Habitats Directive, or within the UK Biodiversity Action Plan of the seas around England and Scotland. The marine natural heritage importance of the researched biotopes is shown in Appendix 7. The number of researched biotopes included in Annex I habitats of the Habitats Directive are shown in Figure 3.

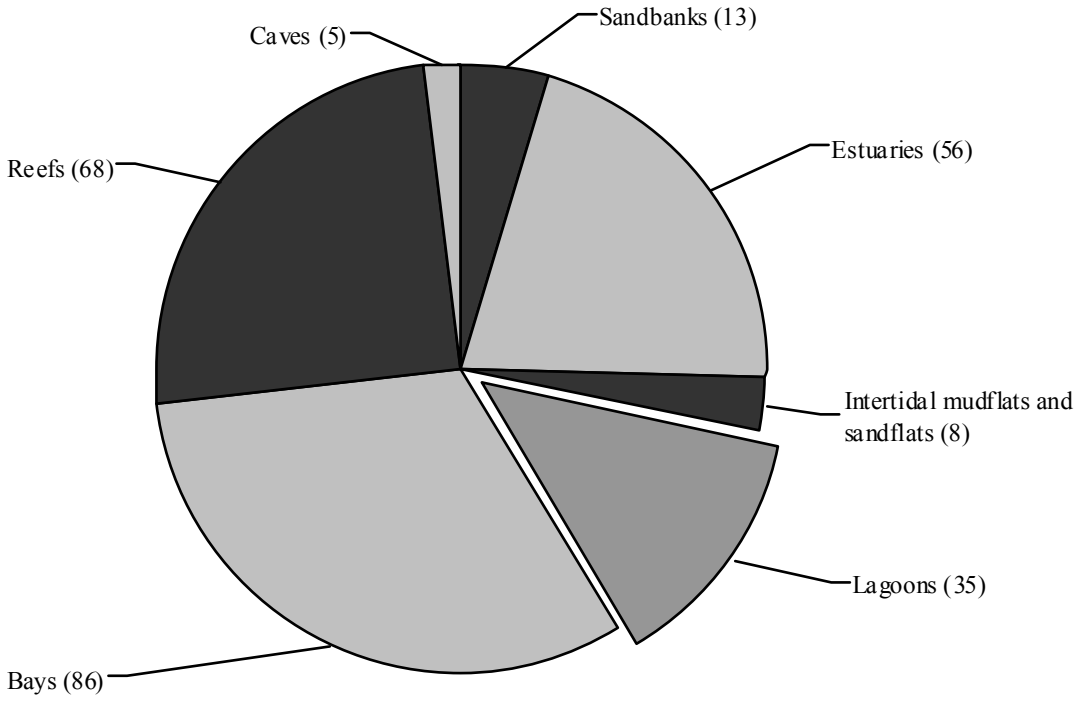

Figure 3 The number of researched biotopes within Annex I habitats of the Habitats Directive

The researched biotopes are also important examples of habitats included in the UK Biodiversity Action Plan. The number of researched biotopes included in Habitat Action Plans is shown in Figure 4. Figure 4 does not include those biotopes that are also included within the broad Habitat Action Plans.

The biotope Key Information reviews are augmented by full Key Information reviews of key, representative or characterizing species, or examples of major species groups (exemplary species). The relevant Key Information reviews are hyperlinked to the biotope Key Information reviews on the Web site.

A full list of the species available on the *MarLIN* Web site is shown on Appendix 5 and includes:

- information on over 420 marine benthic species, of which 149 are full species Key Information reviews;
- 35 full Key Information reviews of species designated or listed under statute or conventions;
- 97 full Key Information reviews of key, characterizing or exemplary species;
- basic information on another 23 species designated or listed under statute or conventions, and
- basic information on another 110 key, characterizing or exemplary species.

In addition, basic information is available for many of the species included in the biotope description or referred to in the biotope Key Information review.

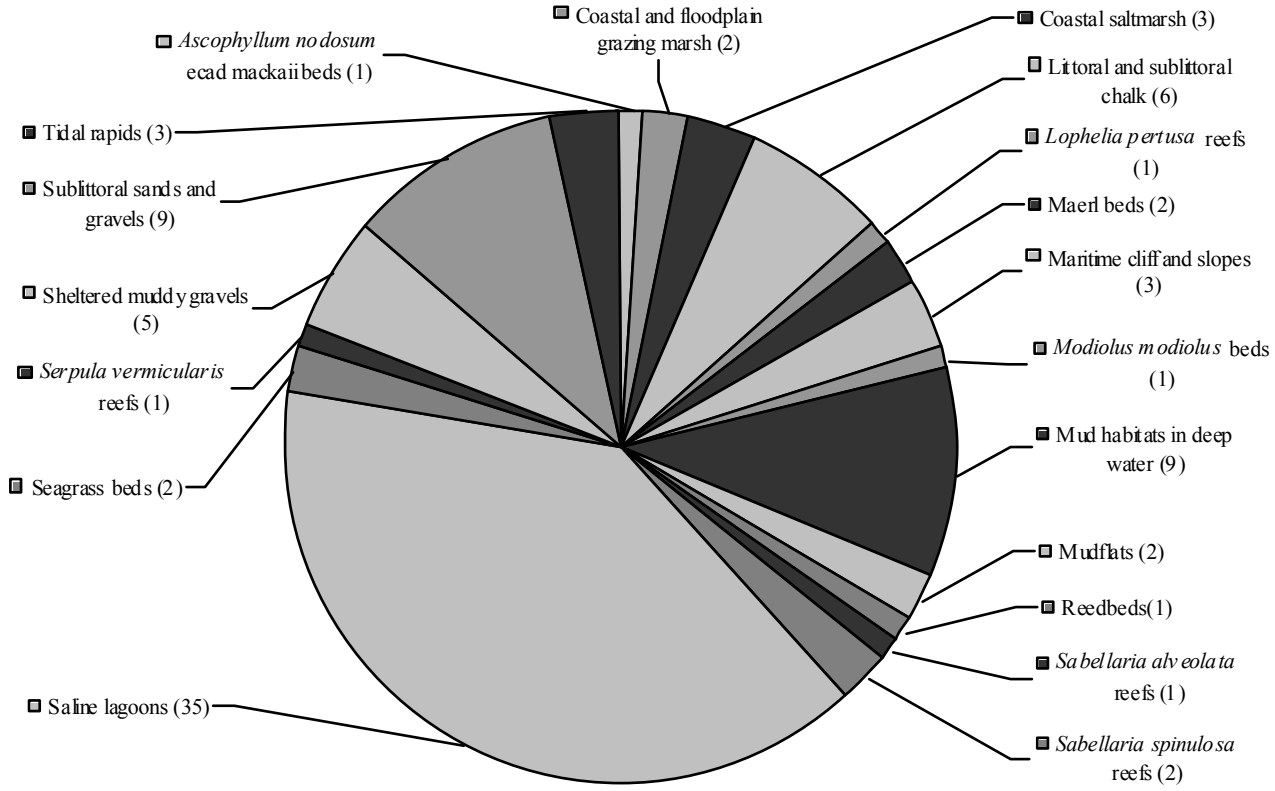

Figure 4 The number of researched biotopes within UK Biodiversity Action Plan habitats

9.2 Biotope Images

The biotope Key Information reviews include images wherever possible. Many biotope images were supplied by the Marine Habitats Team at JNCC. Additional images were supplied by SNH, independent marine photographers, and the Programme Director. At the end of the contract, 73% of the biotope Key information reviews had at least one image and 26% had more than one image (see Appendix 6).

9.3 Peer review

At the beginning of the contract, it was hoped to have refereed all of the Biology and Sensitivity Key Information reviews of both species and biotopes. Peer review is an essential part of *MarLIN*'s quality control procedure and an objective of the programme as a whole.

MarLIN struggled to find experts to referee our reviews throughout the duration of the contract. Identifying referees with expertise in the ecology or sensitivity of biotopes proved to be especially difficult. By the end of the contract, 68 species Key Information reviews had been refereed, ca 45% of the total number prepared. Only 18 (ca 15%) of the biotope Key Information reviews were refereed or with a referee by the end of the contract. Refereed biotopes and their referees are listed in Appendix 6 and on the *MarLIN* Web site.

The main difficulty is still that the *MarLIN* Biology and Sensitivity Key Information reviews are not regarded as a priority by potential referees, so that many take a considerable time and several reminders before they return their comments. Of course, others return comments very quickly. We have made a concerted effort to identify referees for most of the biotopes and are preparing to approach more referees in the early 2003, when we hope to have more time to be able to update our reviews with their comments.

10 Conclusions

The Biology and Sensitivity Key Information Sub-programme has worked in collaboration with the major agencies responsible for marine environmental management and protection and has held expert workshops to achieve the deliverables listed below.

- Reviewed existing approaches to the assessment of the sensitivity and recoverability of marine species and ecosystems to human impacts and natural events, and identified the weaknesses of prior approaches.
- Used the best features of existing systems to develop scientifically sound definitions and criteria for the assessment of sensitivity and recoverability.
- Developed a scientifically sound, systematic and transparent approach to the assessment of sensitivity and recoverability.
- Further developed and identified Key Information fields to inform the assessment of sensitivity and recoverability and support environmental management, protection and education.
- Developed the Biology and Sensitivity database to store and manage Key Information and support on-line interrogation of the information by remote users.
- Developed custom software to publish the Key Information reviews on the World Wide Web in the form of updateable Web pages.
- Designed and developed an interactive, user-friendly Web site (the *MarLIN* Web site) to publish and disseminate the resultant Key Information reviews.
- Developed custom search tools to allow users to interrogate the Biology and Sensitivity database remotely.
- Defined the link between human activities and the environmental factors likely to be affected by those activities.
- Developed additional tools to interrogate the Biology and Sensitivity database remotely to support science based decision making for environmental management and protection.
- Researched and published on the World Wide Web 117 Biology and Sensitivity Key Information reviews on the sensitivity of marine biotopes to 24 separate environmental factors, which in turn represent another 157 biotopes.
- Researched and published on the World Wide Web over 149 Biology and Sensitivity Key Information reviews on the sensitivity of marine species to 24 separate environmental factors.
- Prepared Basic Information on over 280 species in addition to those with full information.
- Developed a peer-reviewed approach to electronic publication of updateable information.
- Produced an extensive searchable, bibliography of references on the biology, ecology and sensitivity of marine species and communities.
- Developed a searchable list of hyperlinks to World Wide Web resources relevant to marine environmental management, protection, and education.

The *MarLIN* Web site, database, and the biotope Key Information reviews have satisfied all the objectives of the contract (see Section 2).

The *MarLIN* programme represents a much more scientifically based and accessible way of assessing the sensitivity and recoverability of seabed species and biotopes than was previously available. Much of the effort in the EN 'A biotope sensitivity database to underpin delivery of the Habitats Directive and Biodiversity Action Plan in the seas around England and Scotland' and the Defra 'Identifying species and ecosystem sensitivities' contracts has been put into establishing approaches and sound standards in consultation with the major users of marine environmental information.

The *MarLIN* approach to sensitivity assessment now provides a standard protocol and a standardized, easy-to-use format, for the dissemination of marine life information. The standards and approaches developed under the Biology and Sensitivity Key Information Sub-programme can be applied throughout the world.

At the end of this contract *MarLIN* reached a 'critical mass' of species and biotope information through having researched the majority of the key structural, key functional or characterizing species and the biotopes (or their representatives) that constitute Habitats Directive Annex I marine habitats.

The recent Marine Stewardship Report prepared by UK Government (Defra 2002) made the following statements.

- *Integrated management must be informed by improved co-ordination and access to spatial data and mapping of the marine environment. We will move towards ensuring that publicly-funded marine environmental data is made as freely available as possible.*
- *Decisions will be based on a clear understanding of natural processes and the ecological requirements of marine species, habitats, and ecosystems.*
- *To reflect the importance of marine science we [Defra] will work with stakeholders to develop co-ordinated monitoring and open access to marine environmental data.*
- *We [Defra] will strive to improve our scientific understanding of our seas in order to base our decisions on the best available knowledge.*

The *MarLIN* Web site already provides information to support marine environmental management decision-making, based on the best available knowledge. The *MarLIN* Web site represents a major source of information on the ecological requirements of marine species, habitats and ecosystems, together with the likely sensitivity of marine biotopes and species to natural or anthropogenic change. As a Web based programme, *MarLIN* provides a platform to freely disseminate marine environmental data. In addition, the Key Information reviews direct the user to reference material and sources of additional information through the on-line references, bibliography, and hyperlink database.

While gaps in the information provided undoubtedly exist, as not every biotope or species can be researched, the *MarLIN* Web site is a valuable information resource and provides a 'one-stop-shop' for marine life information around Britain and Ireland.

The Biology and Sensitivity Key Information database has already proved itself to be an invaluable tool in helping to fulfil the objectives in the Marine Stewardship Report, and in preparing information on the potential effects of marine developments, for example, offshore wind farms (Hiscock *et al.* 2002). *MarLIN* biotope sensitivity assessments prepared under

this contract were recently used to predict the cumulative impacts of offshore industries (Oakwood Environmental 2002).

Within the broad umbrella of the work of *MarLIN*, there are many current initiatives that are or that could be informed by the programme:

- implementation of the Habitats Directive;
- implementation of OSPAR Annex V;
- the European Union marine strategy;
- UK Biodiversity Action Plans;
- the Strategic Environmental Assessment Directive;
- Environmental Impact Assessments;
- licensing of activities;
- sensitivity mapping;
- spatial planning initiatives, and
- interpretation of the results of monitoring.

The approach developed by *MarLIN* is being promoted for use throughout the north-east Atlantic helped by the compatibility of the biotope classification used with that being developed within the European Union Nature Information System (EUNIS). Revisions of the biotopes classification currently underway may require some adjustments to the *MarLIN* database and reviews.

MarLIN information is also needed to plan for the future, to develop new approaches to better marine stewardship such as those being developed for the Water Framework Directive and to concepts such as good ecological status for marine ecosystems, which are central to the development of the European Union marine strategy.

The information on biology and sensitivity is most valuable if it is linked to survey data (where it exists or is especially collected) for an area so that 'are there any species or biotopes in area x that are sensitive to activity y' questions can be asked.

The *MarLIN* team are presently working on a map-based GIS front end for linking the survey data hosted by *MarLIN* and within the MNCR database to sensitivity assessments to prepare simple sensitivity maps of both species and biotopes. It would be equally possible, with adequate funding, to further develop the Biology and Sensitivity Key Information Sub-programme to prepare Sensitivity Atlas's using broader scale mapping units, for example, biotope complexes, habitat complexes, and seascapes. Existing coastal sensitivity maps use surrogates (for instance, whether or not protected sites are present, the occurrence of seabird populations or sea mammal populations) to assess sensitivity of seabed habitats and species. The *MarLIN* approach would allow a sensitivity atlas to be developed for sensitivity to up to 24 separate environmental factors.

11 Recommendations

The following recommendations stem from the conclusions made in Section 10.

1. The *MarLIN* approach for sensitivity assessment should be promoted to organizations in the UK charged with protecting the coastal seas from adverse effects of human activities including accidents and pollution, for example statutory conservation agencies (JNCC, EN, SNH, CCW), regulatory agencies (the Environment Agency, Scottish Environmental Protection Agency, Maritime and Coastguard Agency, Department of Trade and Industry (DTI), Department for Environment, Food and Rural Affairs (Defra), and the Scottish Executive), and agencies charged with advising regulators such as the Centre for Environment, Fisheries and Aquaculture Science (CEFAS) and Fisheries Research Services (FRS).
2. Support should be provided for the maintenance and development of the Biology and Sensitivity Key Information database and the *MarLIN* Web site.
3. Additional biology and sensitivity research should be undertaken on species and biotopes to fill gaps in our present coverage, especially in light of the increasing number of marine candidate SACs. At present we estimate that another 53 key or important characterizing species would fill many of the gaps in our present coverage but cannot estimate the numbers of additional biotopes required until the revised version of the UK biotope classification becomes available.
4. Additional biology and sensitivity research should be undertaken on species and biotopes within habitats identified under international initiatives such as OSPAR, which would require research on an additional six species and three biotopes to date.
5. Collaboration should be sought with other European research partners to develop the *MarLIN* approach to Biology and Sensitivity Key Information for use throughout the European Seas in underpinning the implementation of directives, conventions and agreements such as the Water Framework Directive and the European Union marine strategy.
6. Presentation of *MarLIN* information and the fields researched to produce our Web pages should be reviewed in the light of the requirements of, and likely approaches to, implementation of the Water Framework Directive and other EU initiatives to ensure that topics relevant to management are addressed.
7. Software should be developed so that survey data and sensitivity information can be linked to 'add value' to survey data in the form of sensitivity maps.
8. The *MarLIN* programme should seek collaborative projects with intertidal and seabed mapping projects (such as SensMap and the Irish Sea Pilot) to test the linking of sensitivity information with biotopes or broader scale maps to produce local or regional sensitivity maps.
9. The *MarLIN* approach should be further developed to produce a national Sensitivity Atlas of the coastal seas for seabed environmental protection and management.

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Appendix 1 Guidance for Data Researchers

Biology & Sensitivity Key Information reviews aim to 'support marine environmental management, protection and education'. Therefore, they target the information required to achieve that aim. The reviews are designed to be read by a wide audience, from environmental managers and statutory agency staffto marine scientists and members of the public. Therefore, the writing style should be concise, yet accurate and the text kept to a minimum. It should be remembered that many environmental and coastal managers are not marine biologists. The defined categories used in the Key Information template and Web pages present large amounts of information in a short, concise manner.

Full Key Information reviews will, once refereed and updated, be cited as peer reviewed publications.

Time constraints

Due to the nature of our deadlines, it is important to be conscious of our time constraints. We aim to complete a species review (from literature review to completed draft review) within **three to five days** and a biotope review within **less than five days.** However, the level of information that needs to be collated and read through varies with the species or biotope. Therefore, the following guidelines are given to minimize data research time. Suggested time and text limits are given.

Literature retrieval (one day)

Keep the literature search targeted on the information and categories covered by the Key Information template, sensitivity, and recoverability.

- Begin by using the NMBL database and ASFA. Only if few references are found should the search be expanded to Web of Science and NISC.
- Examine the *MarLIN* bibliography and our stock of photocopies and reprints for relevant general information. Members of the *MarLIN* team can advise on relevant information sources.
- Search by species name and common name in the first instance. If large numbers of references are found the following keywords can be used to focus the literature review of species:
    - growth and reproduction;
    - recruitment and mortality;
    - impacts and pollution;
    - each environmental factor, such as suspended sediment, wave exposure or diseases;
    - harvesting and fisheries.
- Biotope literature reviews should focus on general material on the relevant dominant functional groups (for example fucoids, sponges, or burrowing infauna) and intertidal or subtidal ecology. If large numbers of references are found the following keywords can be used to focus the literature review of biotopes:
    - community;
    - productivity;
    - impacts and pollution;
    - each environmental factor, such as suspended sediment or water flow;
    - exploitation (harvesting and fisheries).

- Prioritize review papers and reports.
- Avoid information that is not directly relevant to environmental management, conservation, and protection or the assessment of sensitivity and recoverability. The reader should be directed to sources of this information if important, that is, the species or biotope is well studied and the review would appear to be remiss if the information is not mentioned. For example the following information is not relevant:
    - genetic and biomedical information, except where harvesting for biomedical or pharmaceutical products may be a threat to the population / community;
    - evolution and phylogenetics, except where pertinent to taxonomy;
    - molecular and cellular biochemistry and physiology, unless directly relevant to sensitivity, for example anaerobic metabolism and tolerance of anoxia, and
    - neurophysiology.

Writing style

- Key Information reviews should be written in the style of scientific reports or reviews. Detailed aspects are covered under the house-style guidelines.
- Text should be concise, as short as possible without losing detail.
- Technical terminology and jargon should be kept to a minimum or explained in the text. Where necessary, scientific terms should be added to the relevant glossary.
- Avoid extrapolation from the available information. Where the information does not support a decision or does not provide adequate detail, insert 'data deficient' or 'insufficient information', as appropriate. Where the available information on a subject area is missing, insert 'no information found'.
- References should be given in the text, in short format, as they are mentioned (such as Jones, 1997; Jones & Jones, 1998; Jones *et al.,* 1999). Wherever possible the original source reference should be cited, even if the information is retrieved from a review paper or report.

Completing the species Key Information *pro forma* (two to four days)

General

- Pay particular attention to information required for the management or conservation of the species and the assessment of its sensitivity and recoverability.
- Keep to the Key Information template categories (and automated glossaries).
- Add 'additional information' where aspects of a species or biotopes ecology do not fit neatly within the defined categories. 'Additional information' is also used to clarify ambiguous material or to add Key Information that would be omitted otherwise.
- Keep the writing style short, concise and use bullet points wherever possible.
- Keep 'additional information' to a minimum, **no more than three paragraphs (max. 300 words).**
- Point the reader to sources of detailed information rather than re-iterate the information.
- **You should aim to spend about one day reading, less than one day on the biology Key Information, and one to two days on sensitivity and recoverability.**

- Where a biotope or species has been poorly studied, only readily available information should be used. Information that cannot be obtained within **less than three days** should be ignored in the draft review and not subject to further research. Our referees or outside experts may add relevant material in due course.

Basic information

- The 'basic information' page is likely to be read by the widest audience, including members of the public and school children.
- Keep jargon and technical terms to a minimum and/or explain terms where possible.
- The description should be no more than a single paragraph. Exceptions and similar or confused species can be mentioned in 'additional information'.

Taxonomy and Identification

- Taxonomic information is supplied by the MCS Species Directory and no further research is required.
- List key identification features as single line bullet points to allow the user to distinguish between species but do not try to duplicate the detail of an identification key.

General biology

- Most fields can be completed using the pull down fields.
- Add 'additional information' to clarify ambiguous points or exceptions to the general biology fields. Emphasize seasonal and temporal changes.
- Do not complete larval general biology.

Habitat preferences and distribution

- Distribution maps are based, primarily, on readily available survey information gleaned from the MNCR database (via MERMAID or searchnbn.net), published flora and fauna, identification guides (such as the Linnean Society Synopses of British Fauna), and other survey data from papers, reports or held within the *MarLIN* Data Access Sub-programme.
- Do not complete larval distribution.

Reproduction and longevity

- Pay particular attention to factors that affect mortality (larval, juvenile and adult) or reproductive success.
- Factors affecting reproductive success, larval mortality and recruitment inform our decisions on recoverability.
- Note that modes of reproduction are highly variable and several of the Key Information template categories may need clarification in additional information.

Sensitivity and recoverability

Sensitivity and recoverability rationale must be able to justify the assessments. In many cases, this function requires a high level of detail, so that the user can compare the presented data with our benchmarks or a predicted impact or proposed activity. It is important to present both information demonstrating impacts, and information demonstrating no effect. The opinion given in the sensitivity assessment must be seen to be transparent, balanced, and impartial. **However, text should be kept to a minimum, no more than two paragraphs, bulleted where possible (about 200 words, with a maximum of about 300 words).**

- The flow charts presented in *MarLIN* Report No 4 should consulted when assessing sensitivity or recoverability.
- The flow charts ensure that assessments are made in a systematic manner. The flow charts are particularly useful for making 'common sense' assessments when little information is available.
- The assessment should be included in the text, for example; '..therefore, a sensitivity of high has been recorded.' A similar statement should be made for recoverability. Each rationale should be written to 'stand alone' as the user may only read the rationale for the factor of interest.
- To avoid repetition, general background information on recoverability may be placed under 'additional information'. Any information placed in 'additional information' should be referred to with the phrase '(see additional information below)'.
- Do not complete larval sensitivity and recoverability. Insert 'Not researched' and 'Not relevant' as appropriate. Point the reader to surrogate species, where the research has already been undertaken, for example *Mytilus edulis* for bivalves, *Hediste diversicolor* for annelids and *Asterias rubens* for echinoderms.

Importance

Include information to clarify the 'importance' fields. Pay attention to information on important communities or species supported by the species (for example wildfowl are dependant on intertidal mudflat communities) and the species importance to man, if any (for instance the species' importance in stabilizing sediment and, hence, coastal defence). Additional information should be kept to a minimum (see above).

Completing the biotope Key Information *pro forma* (two to five days)

General

- Pay particular attention to information required for the management or conservation of the biotope and the assessment of its sensitivity and recoverability.
- Keep to the Key Information template categories (and automated glossaries).
- Keep the writing style short, concise and use bullet points wherever possible.
- Keep 'additional information' to a minimum, **no more than a paragraph (less than 150 words).**
- Point the reader to sources of detailed information rather than re-iterate the information.
- **You should aim to spend about one day reading, one to two days on the ecology Key Information, and one to two days on sensitivity and recoverability.**
- Where a biotope or species has been poorly studied, only readily available information should be used. Information that can not be obtained within **less than three days** should be omitted in the draft review. Our referees or outside experts may add relevant material in due course.

Basic Information

- Automatically brought in from the Biotope dictionary (Connor *et al.* 1997a, b).
- National status, as stated in the biotope manual or 'Not available'.

Biotope classification - automated

- Add information on other classification schemes where available, such as EUNIS.

Ecology and additional ecology

- Include key points about the ecology of the biotope that are of particular relevance to environmental management, conservation or protection.
- Ecological relationships – a statement of the major relationships and interactions between species within the biotope, for instance food web, primary and secondary producers, predators and competition (for space, light or resources).
- Habitat complexity – a description of the structure and diversity (physical and community) of the biotope.
- Productivity – a description of the relative primary and secondary productivity of the biotope.
- Temporal and seasonal change – a description of seasonal, annual or other temporal changes within the biotope, especially dynamic cyclic changes in the community (for example Kelp-urchin interactions and fucoid-barnacle dominance).
- Recruitment processes – a description of the processes involved in the recruitment of the key and characterizing species within the biotope, together with the biotopes role in the recruitment of other species, such as nurseries.
- Time to reach maturity – a description of the time and processes required for a community to reach maturity, together with the factors likely to affect the time required. Maturity is pragmatically defined as the fully diverse, or complex community exemplified by the biotope.
- Biotope ecology provides space for considerable amounts of information. However, most users, especially rushed consultants and statutory agency staff, will not read large volumes of information. Therefore, keep the text to a minimum:
    - no more that two paragraphs per section, up to 300 words;
    - no more than one bullet per tropic level under 'ecological relationships', up to 400 words (500 max.); and
    - no more than one bullet point per level of complexity within 'habitat complexity', up to 400 words (500 max.).

Habitat preferences and distribution

- Distribution maps of biotopes should be based on the MNCR database (via MERMAID or searchnbn.net) and the MNCR area summaries.
- In the short term, ignore the discrepancies between the MNCR database, MNCR biotope manual, MNCR area summaries, and Reg. 33 guidance notes. Biotope distribution maps may be updated as additional staff resources become available.

Species composition

- 'Species indicative of biotope sensitivity' are chosen using the criteria laid down in *MarLIN* Report No 4.
- Where possible species key or important to the ecology of the community are chosen. Where the ecology is poorly understood, characterizing species are chosen as surrogates. The reasons for choosing each species should be detailed in the following explanation.

Information concerning species richness and survey data should be included under 'additional information'.

Sensitivity and recoverability

- The writing style follows the same criteria as for species above.

The 'species indicative of biotope sensitivity' are used to derive sensitivity and recoverability assessments for each factor using the rationale and flow charts laid out in *MarLIN* Report No 4. The assessments should take into account the general ecology of the biotope, including the other species within the biotope, and the sensitivity and recoverability assessments modified accordingly. **However, text should be kept to a minimum, no more than three paragraphs, bulleted where possible (about 300 words, with a maximum of about 400 words).**

- Species richness – potential effects on species richness have proven difficult to assess, and are often subjective. The likely effect of a change in an environmental factor on species richness as a result of its sensitivity is recorded, for instance 'high' sensitivity is likely to cause a major decline in species richness. Recoverability is not taken into account. This is a change from the original rationale (see *MarLIN* Report No 4).

Importance

- Pay particular attention to information concerning the importance of the biotope for other species not included within the biotope such as predatory or herbivorous fish, wildfowl, or man.
- Do not research or complete information concerning potential management measures or practice for biotopes. This is beyond the scope of the programme.

Appendix 2 Biotope biology and sensitivity Key Information *pro forma* (May 2000 onwards)

(MERMAID) = Linked data from JNCC Mermaid Web pages)

BASIC INFORMATION

Biotope name
MNCR Biotope code
1. **Information researched by**
2. **Information entered by**
3. **Information refereed by**
4. **Date last updated**
5. **Image and distribution map**
6. **British and Irish Distribution**
7. **National status**
8. **Description (from Connor *et al.* 1997 a, b)**

BIOTOPE CLASSIFICATION

1. **UK and Ireland Classification**
2. **MNCR Habitat Complex**
3. **MNCR Biotope Complex**
4. **MNCR Biotope**
5. **Similar Biotopes** Other biotopes that could be confused with this biotope or characterized by the same species
6. **Biotopes represented by Key Information review**
7. **Characterizing species (MERMAID)** Species name, abundance, frequency, faithfulness
8. **Additional Information** Other classifications (for example, EUNIS, ZNIEFF-MER, Wadden Sea, Helcon)
9. **Key references**

ECOLOGY

1. **Ecological Relationships**
2. **Seasonal or longer term change**
3. **Key references**

ADDITIONAL ECOLOGY

1. **Habitat Complexity**
2. **Dominant trophic groups** Photoautotrophs, Chemoautotrophs, Deposit feeders (detritivors), Suspension feeders, Herbivores, Predators, Scavengers, Epifaunal grazers, Not relevant, No information found, Data deficient, Field unresearched.
3. **Productivity**
4. **Major sources of organic carbon** Photosynthesis (macroalgae and halophytic plants), Photosynthesis (microalgae), Chemoautotrophs, Detritus, Dissolved organic matter, Not relevant, Data deficient, Field unresearched
5. **Recruitment processes**
6. **Time for the community to reach maturity**
7. **Additional Information**
8. **Key references**

HABITAT PREFERENCES AND DISTRIBUTION

1. **British and Irish Distribution**
2. **Distribution map**
3. **Habitat preferences**
   - **Substratum (MERMAID)**
   - **Zone (MERMAID)**
   - **Depth range (MERMAID)**
   - **Wave exposure (MERMAID)**
   - **Tidal streams (MERMAID)**
   - **Salinity (MERMAID)**
   - **Temperature range**
   - **Water clarity** High clarity/Low Turbidity, Low clarity/ High turbidity, Very high turbidity, No preference, Not relevant, No information found, Data deficient, Field unresearched.
   - **Limiting nutrients** Nitrogen (nitrates), Phosphorus (phosphates), Silicon (silicates), Manganese, Iron, Not relevant, No information found, Data deficient, Field unresearched.
   - **Other preferences**
4. **Additional Information**
5. **Key references**

SPECIES COMPOSITION

1. **Characterizing species (MERMAID)** Species name, abundance, frequency, faithfulness
2. **Species indicative of sensitivity** Key structural/functional, important characterizing, important structural/functional, important other.
3. **Explanation**
4. **Species found uniquely in the biotope**
5. **Nationally rare or scarce species associated with biotope**
6. **Additional information**
7. **Key references**

BIOTOPE SENSITIVITY

1. **Sensitivity to factors (ranked against the factors below)**
2. **Recoverability (ranked against the factors below)**
3. **Likely change in species richness** Major decline/decline/minor decline/no change/ rise/ not relevant.
4. **Evidence / Confidence**
5. **Species used to indicate biotope sensitivity or recoverability**
   - *Presentation of sensitivity assessments for species that indicate biotope sensitivity*
   - *Presentation of recoverability assessments for species that indicate biotope sensitivity*
6. **Additional information**
7. **Key references**

Factors (environmental)

Physical factors	Substratum loss
	Smothering
	Suspended sediment
	Desiccation
	Changes in emergence regime
	Changes in water flow rate
	Changes in temperature
	Changes in turbidity
	Changes in wave exposure
	Noise
	Visual presence
	Abrasion and physical disturbance
	Displacement
Chemical factors	Synthetic compounds
	Heavy metals
	Hydrocarbons
	Radionuclides
	Changes in nutrient levels
	Changes in salinity
	Changes in oxygenation
Biological factors	Introduction of microbial pathogens
	Introduction of non-native species and translocation
	Selective extraction of this species
	Selective extraction of other species

MARINE NATURAL HERITAGE IMPORTANCE

1. Legislation

Protected status or relevance under directives and conventions

Berne Convention
EC Habitats Directive
NI Conservation legislation
UK Biodiversity Action Plans
UK Biodiversity Action Plan habitat
EC Directive Annex I habitat
Other

2. National status Is the biotope nationally rare or scarce?

3. Habitat Directive feature Reefs, Estuaries, etc (data supplied by EN/SNH).

4. Exploitation Description of the commercial, aquacultural, research, curio, or culinary exploitation of the habitat.

5. Biotope importance for other species

6. Additional information

7. Key references

Appendix 3 Final list of researched and representative biotopes at the end of the contract (November 2002). Researched biotopes are shown in bold.

LITTORAL ROCK (and other hard substrata)

LICHENS AND ALGAL CRUSTS

Biotope name		Biotope code
Chrysophyceae on vertical upper littoral fringe soft rock.		**LR.L.Chr**
Represents:	*Blidingia* spp. on vertical littoral fringe soft rock.	LRL.L.Bli
	Ulothrix flacca and *Urospora* spp. on freshwater-influenced vertical littoral fringe soft rock.	LR.L.Ulo.Uro
Yellow and grey lichens on supralittoral rock.		**LR.L.YG**
Represents:	*Prasiola stipitata* on nitrate-enriched supralittoral or littoral fringe rock.	LR.L.Pra
	Verrucaria maura on littoral fringe rock.	LR.L.Ver
	Verrucaria maura and *Porphyra umbilicalis* on very exposed littoral fringe rock.	LR.L.Ver.Por
	Verrucaria maura and sparse barnacles on exposed littoral fringe rock.	LR.L.Ver.B
	Verrucaria maura on moderately exposed to very sheltered upper littoral fringe rock.	LR.L.Ver.Ver

EXPOSED LITTORAL ROCK (mussel and barnacle shores)

Biotope name		Biotope code
***Mytilus edulis* and barnacles on very exposed eulittoral rock.**		**ELR.MB.MytB**
Barnacles and *Patella* spp. on exposed or moderately exposed, or vertical sheltered eulittoral rock.		**ELR.MB.Bpat**
Represents:	*Chthamalus* spp. on exposed upper eulittoral rock.	ELR.MB.Bpat.Cht
	Barnacles and *Lichina pygmaea* on steep exposed upper eulittoral rock.	ELR.MB.Bpat.Lic
	Catenella caespitosa on overhanging, or shaded vertical, upper eulittoral rock.	ELR.MB.Bpat.Cat
	Barnacles, *Patella* spp. and *Fucus vesiculosus* f. *linearis* on exposed eulittoral rock.	ELR.MB.Fvesl
	Semibalanus balanoides on exposed or moderately exposed, or vertical sheltered, eulittoral rock.	ELR.MB.Bpat.Sem
***Fucus distichus* subsp. *anceps* and *Fucus spiralis* f. *nana* on extremely exposed upper eulittoral rock.**		**ELR.FR.Fdis**
***Corallina officinalis* on very exposed lower eulittoral rock.**		**ELR.FR.Coff**
***Himanthalia elongata* and red seaweeds on exposed lower eulittoral rock.**		**ELR.FR.Him**
Represents:	Mixed red seaweeds on moderately exposed lower eulittoral rock.	MLR.R.XR
	Palmaria palmata on very to moderately exposed lower eulittoral rock.	MLR.R.Pal
	Mastocarpus stellatus and *Chondrus crispus* on very to moderately exposed lower eulittoral rock.	MLR.R.Mas
	Osmundea (Laurencia) pinnatifida and *Gelidium pusillum* on moderately exposed mid eulittoral rock.	MLR.R.Osm

MODERATELY EXPOSED LITTORAL ROCK (barnacle and fucoid shores)

Biotope name		Biotope code
Barnacles and fucoids (moderately exposed shores).		**MLR.BF**
Represents:	*Pelvetia canaliculata* and barnacles on moderately exposed littoral fringe rock.	MLR.BF.PelB
	Fucus vesiculosus and barnacle mosaics on moderately exposed mid eulittoral rock.	MLR.BF.FvesB
	Fucus serratus on moderately exposed lower eulittoral rock.	MLR.BF.Fser
	Fucus serratus and red seaweeds on moderately exposed lower eulittoral rock.	MLR.BF.Fser.R
	Dense *Fucus serratus* on moderately exposed to very sheltered lower eulittoral rock.	MLR.BF.Fser.Fser
	Fucus serratus and piddocks on lower eulittoral soft rock.	MLR.BF.Fser.Pid
	Pelvetia canaliculata on sheltered littoral fringe rock.	SLR.F.Pel
	Fucus spiralis on moderately exposed to very sheltered upper eulittoral rock.	SLR.F.Fspi
	Fucus vesiculosus on sheltered mid eulittoral rock.	SLR.Fves
	Fucus serratus on sheltered lower eulittoral rock.	SLR.F.Fserr
	Fucus serratus, sponges and ascidians on tide-swept lower eulittoral rock.	SLR.F.Fserr.T
	Fucus serratus and large *Mytilus edulis* on variable salinity lower eulittoral rock.	SLR.F.Fserr.VS
***Fucus serratus* and under-boulder fauna on lower eulittoral boulders.**		**MLR.BF.Fser.Fser.Bo**
Represents:	*Laminaria digitata* and under-boulder fauna on sublittoral fringe boulders.	MIR.KR.Ldig.Ldig.Bo
***Ceramium* sp. and piddocks on eulittoral fossilised peat.**		**MLR.R.RPid**
***Rhodothamniella floridula* on sand-scoured lower eulittoral rock.**		**MLR.Eph.Rho**
***Enteromorpha* spp. on freshwater influenced or unstable upper eulittoral rock.**		**MLR.Eph.Ent**
Represents:	*Porphyra purpurea* or *Enteromorpha* spp. on sand-scoured mid to lower eulittoral rock.	MLR.Eph.EntPor
	Ephemeral green and red seaweeds on variable salinity or disturbed eulittoral mixed substrata.	SLR.FX.EphX
***Mytilus edulis* and *Fucus vesiculosus* on moderately exposed mid-eulittoral rock).**		**MLR.MF.MytFves**
Represents:	*Mytilus edulis* beds on eulittoral mixed substrata.	SLR.MX.MytX
	Mytilus edulis, *Fucus serratus* and red seaweeds on moderately exposed lower eulittoral rock.	MLR.MF.MytFR
	Mytilus edulis and piddocks on eulittoral firm clay.	MLR.MF.Myt.Pid
***Sabellaria alveolata* reefs on sand-abraded eulittoral rock.**		**MLR.Sab.Salv**

SHELTERED LITTORAL ROCK (fucoid shores)

Biotope name		Biotope code
***Ascophyllum nodosum* on very sheltered mid eulittoral rock.**		**SLR.F.Asc**
Represents:	*Ascophyllum nodosum* on full salinity mid eulittoral rock.	SLR.F.Asc.Asc
	Ascophyllum nodosum, sponges and ascidians on tide-swept mid eulittoral rock.	SLR.F.Asc.T
	Ascophyllum nodosum and *Fucus vesiculosus* on variable salinity mid eulittoral rock.	SLR.F.Asc.VS
***Ascophyllum nodosum* ecad *mackaii* beds on extremely sheltered mid eulittoral mixed substrata.**		**SLR.FX.AscX.mac**
***Fucus ceranoides* on reduced salinity eulittoral rock.**		**SLR.F.Fcer**
Represents:	*Fucus ceranoides* on reduced salinity mixed substrata.	SLR.FX.FcerX
	Fucus ceranoides and *Enteromorpha* spp. on low salinity infralittoral rock.	SIR.Lag.FcerEnt
***Fucus vesiculosus* on mid eulittoral mixed substrata.**		**SLR.FX.FvesX**
Represents:	*Ascophyllum nodosum* on mid eulittoral mixed substrata.	SLR.FX.AscX
	Fucus serratus on lower eulittoral mixed substrata.	SLR.FX.FserX
	Fucus serratus with sponges, ascidians and red seaweeds on tide-swept lower eulittoral mixed substrata.	SLR.FX.FserX.T
Barnacles and *Littorina littorea* on unstable eulittoral mixed substrata.		**SLR.FX.BLlit**

LITTORAL ROCK (other)

Biotope name		Biotope code
Green seaweeds (*Enteromorpha* spp. and *Cladophora* spp.) in upper shore rockpools.		**LR.Rkp.G**
***Corallina officinalis* and coralline crusts in shallow eulittoral rockpools.**		**LR.Rkp.Cor**
Represents:	Seaweeds in sediment (sand or gravel)-floored eulittoral rockpools.	LR.Rkp.SwSed
	Coralline crusts and *Paracentrotus lividus* in shallow eulittoral rockpools.	LR.Rkp.Cor.Par
	Bifurcaria birfurcata in shallow eulittoral rockpools.	LR.Rkp.Co.Bif
	Cystoseira spp. in shallow eulittoral rockpools.	LR.Rkp.Co.Cys
Overhangs and caves		**LR.Ov**
Represents:	Sponges and shade tolerant red seaweeds on overhanging lower shore bedrock.	LR.Ov.SR
	Sponges, bryozoans and ascidians on deeply overhanging lower shore bedrock.	LR.Ov.SByAs
***Rhodothamniella floridula* in littoral fringe soft rock caves.**		**LR.Ov.RhoCv**

LITTORAL SEDIMENTS

LITTORAL GRAVELS AND SANDS

Biotope name		Biotope code
Barren coarse sand shores.		**LGS.S.BarSnd**
Represents:	Barren shingle or gravel shores	LGS.Sh.BarSh
***Pectenogammarus planicrurus* in mid shore well-sorted gravel or coarse sand.**		**LGS.Sh.Pec**
Talitrid amphipods in decomposing seaweed on the strandline.		**LGS.S.Tal**
Burrowing amphipods and *Eurydice pulchra* in well-drained clean sand shores.		**LGS.S.Aeur**
Represents:	Burrowing amphipods and polychaetes in clean sand shores.	LGS.S.AP
	Burrowing amphipods and polychaetes (often with *Arenicola marina*) in clean sand shores.	LGS.S.AP.P
	Burrowing amphipods *Pontocrates* spp. and *Bathyporeia* spp. in lower shore clean sand.	LGS.S.Ap.Pon
	Oligochaetes in reduced or low salinity gravel or coarse sand shores.	LGS.Est.Ol
Dense *Lanice conchilega* in tide-swept lower shore sand.		**LGS.S.Lan**

LITTORAL MUDDY SANDS

Biotope name		Biotope code
Muddy sand shores.		**LMS.MS**
Represents:	*Bathyporeia* spp. and *Corophium* spp. in upper shore slightly muddy fine sands.	LMS.MS.BatCor
	Polychaetes and *Cerastoderma edule* in fine sand and muddy sand shores.	LMS.MS.PCer
	Macoma balthica and *Arenicola marina* in muddy sand shores.	LMS.MS.Mac.Are
***Zostera noltii* beds in upper to mid shore muddy sand.**		**LMS.Zos.Znol**

LITTORAL MUDS

Biotope name		Biotope code
***Puccinella maritima* saltmarsh community**		**LMU.Sm (low mid) (NVC SM13)**
Represents:	Saltmarsh (drift-line)	LMU.Sm (drift-line)
***Salicornia* sp. pioneer saltmarsh**		**LMU.Sm (NVC SM8)**
***Hediste diversicolor* and *Macoma balthica* in sandy mud shores.**		**LMU.Smu.HedMac**
Represents:	*Hediste diversicolor*, *Macoma balthica* and *Arenicola marina* in muddy sand or sandy mud shores.	LMU.Smu.HedMac.Are
	Hediste diversicolor, *Macoma balthica* and *Pygospio elegans* in sandy mud shores.	LMU.Smu.HedMac.Pyg
	Hediste diversicolor, *Macoma balthica* and *Mya arenaria* in sandy mud shores.	LMU.Smu.HedMac.Mare
	Hediste diversicolor and *Scrobicularia plana* in reduced salinity mud shores.	LMU.Mu.HedScr
	Hediste diversicolor and *Streblospio shrubsolii* in sandy mud or soft mud shores.	LMU.Mu.HedStr
	Hediste diversicolor and oligochaetes in low salinity mud shores.	LMU.Mu.HedOl

INFRALITTORAL ROCK (and other hard substrata)

EXPOSED INFRALITTORAL ROCK

Biotope name		Biotope code
Alaria esculenta **on exposed sublittoral fringe rock.**		**EIR.KfaR.Ala**
Represents:	*Alaria esculenta*, *Mytilus edulis* and coralline crusts on very exposed sublittoral fringe bedrock.	EIR.KfaR.Ala.Myt
	Alaria esculenta and *Laminaria digitata* on exposed sublittoral fringe bedrock.	EIR.KfaR.Ala.Ldig
	Alaria esculenta forest with dense anemones and sponge crusts on extremely exposed infralittoral bedrock.	EIR.KfaR.AlaAnSC
Laminaria hyperborea **forest with a faunal cushion (sponges and polyclinids) and foliose red seaweeds on very exposed infralittoral rock.**		**EIR.KfaR.LhypFa**
Laminaria hyperborea **with dense foliose red seaweeds on exposed infralittoral rock.**		**EIR.KfaR.LhypR**
Represents:	*Laminaria hyperborea* with dense foliose red seaweeds on exposed upper infralittoral rock.	EIR.KfaR.LhypR.Ft
	Laminaria hyperborea with dense foliose red seaweeds on exposed lower infralittoral rock.	EIR.KfaR.LhypR.Pk
	Mixed *Laminaria hyperborea* and *Laminaria ochroleuca* forest on exposed infralittoral rock.	EIR.KfaR.LhypR.Loch
	Laminaria hyperborea park/forest and foliose red seaweeds with diverse fauna on tide-swept infralittoral rock.	MIR.KR.LhypT
	Laminaria hyperborea and foliose red seaweeds on moderately exposed infralittoral rock.	MIR.KR.Lhyp
	Laminaria hyperborea forest with dense foliose red seaweeds on moderately exposed upper infralittoral rock.	MIR.KR.Lhyp.Ft
	Laminaria hyperborea park and foliose red seaweeds on moderately exposed lower infralittoral rock.	MIR.KR.Lhyp.Pk
	Laminaria hyperborea forest, foliose red seaweeds, and a diverse fauna on tide-swept upper infralittoral rock.	MIR.KR.Lhyp.TFt
	Laminaria hyperborea park with hydroids, bryozoans, and sponges on tide-swept lower infralittoral rock.	MIR.KR.Lhyp.TPk
	Mixed *Laminaria hyperborea* and *Laminaria ochroleuca* forest on moderately exposed infralittoral rock.	MIR.KR.Lhyp.Loch
Laminaria saccharina **and/or** ***Saccorhiza polyschides*** **on exposed infralittoral rock.**		**EIR.KfaR.LsacSac**
Foliose red seaweeds on exposed or moderately exposed lower infralittoral rock.		**EIR.KfaR.FoR**
Represents:	Foliose red seaweeds with dense *Dictyota dichotoma* and/or *Dictyopteris membranacea* on exposed lower infralittoral rock.	EIR.KfaR.FoR.Dic
	Foliose seaweeds and coralline crusts in surge gully entrances.	EIR.SG.FoSwCC

Biotope name		Biotope code
Sponge crusts and anemones on wave-surged vertical infralittoral rock.		**EIR.SG.SCAn**
Represents:	Sponge crusts and anemones and *Tubularia indivisa* in shallow infralittoral surge gullies.	EIR.SG.SCAn.Tub
	Sponge crusts and ascidians on wave-surged vertical infralittoral rock.	EIR.SG.SCAs
	Dendrodoa grossularia and *Clathrina coriacea* on wave-surged vertical infralittoral rock.	EIR.SG.SCAs.DenCla
	Sponge crusts, colonial (polyclinid) ascidians and a bryozoan/hydrozoan turf on wave-surged vertical or overhanging infralittoral rock.	EIR.SG.SCAs.ByH
	Sponge crusts on extremely wave-surged infralittoral cave or gulley walls.	EIR.SG.SC

MODERATELY EXPOSED INFRALITTORAL ROCK

Biotope name		Biotope code
***Laminaria digitata* on moderately exposed sublittoral fringe rock.**		**MIR.KR.Ldig.Ldig**
Represents:	*Laminaria digitata*, ascidians and bryozoans on tide-swept sublittoral fringe bedrock.	MIR.KR.Ldig.T
	Fucoids and kelps in deep eulittoral rockpools.	LR.Rkp.FK
***Laminaria digitata* and piddocks on sublittoral fringe soft rock.**		**MIR.KR.Ldig.Pid**
***Sabellaria spinulosa* with kelp and red seaweeds on sand-influenced infralittoral rock.**		**MIR.SedK.SabKR**
Grazed *Laminaria hyperborea* with coralline crusts on infralittoral rock		**MIR.LhypGz**
Represents:	*Echinus*, brittlestars and coralline crusts on grazed infralittoral rock.	SIR.K.EchBriCC
	Sparse *Laminaria hyperborea* and dense *Paracentrotus lividus* on exposed infralittoral limestone.	EIR.KfaR.LypPar
	Grazed *Laminaria hyperborea* park with coralline crusts on infralittoral rock.	MIR.Gzk.LhypGz.Pk
	Grazed *Laminaria hyperborea* forest with coralline crusts on upper infralittoral rock.	MIR.Gzk.LhypGz.Ft
***Laminaria saccharina*, *Chorda filum* and dense red seaweeds on shallow unstable infralittoral boulders and cobbles.**		**MIR.SedK.LsacChoR**
Represents:	Ephemeral red seaweeds and kelps on tide-swept mobile infralittoral cobbles.	MIR.SedK.EphR
	Mixed kelps with scour-tolerant and opportunistic foliose red seaweeds on scoured or sand-covered infralittoral rock.	MIR.SedK.XKscrR
	Saccorhiza polyschides and other opportunistic kelps on disturbed upper infralittoral rock.	MIR.SedK.Sac
***Halidrys siliquosa* and mixed kelps on tide-swept infralittoral rock with coarse sediment.**		**MIR.SedK.HalXK**
***Polyides rotundus*, *Ahnfeltia plicata*, and *Chondrus crispus* on sand-covered infralittoral rock.**		**MIR.SedK.PolAhn**

SHELTERED INFRALITTORAL ROCK

Biotope name		Biotope code
***Laminaria saccharina* park on very sheltered lower infralittoral rock.**		**SIR.K.Lsac.Pk**
Represents:	Mixed kelps *Laminaria hyperborea* and *Laminaria saccharina* on sheltered infralittoral rock.	SIR.K.LypLsac.
	Mixed kelps *Laminaria hyperborea* and *Laminaria saccharina* forest on sheltered upper infralittoral rock.	SIR.K.LhypLsac.Ft
	Mixed kelps *Laminaria hyperborea* and *Laminaria saccharina* park on sheltered lower infralittoral rock.	SIR.K.LhypLsac.Pk
	Laminaria saccharina on very sheltered infralittoral rock.	SIR.K.Lsac
	Laminaria saccharina and *Laminaria digitata* on sheltered sublittoral fringe rock.	SIR.K.Lsac.Ldig
	Laminaria saccharina forest on very sheltered upper infralittoral rock.	SIR.K.Lsac.Ft
	Sparse *Laminaria saccharina* with *Codium* spp. and sparse red seaweeds on heavily silted very sheltered infralittoral rock.	SIR.K.Lsac.Cod
***Laminaria saccharina*, foliose red seaweeds, sponges and ascidians on tide-swept infralittoral rock.**		**SIR.K.Lsac.T**
***Laminaria saccharina* on reduced salinity infralittoral rock.**		**SIR.K.LsacRS**
Represents:	Sparse *Laminaria saccharina* with dense filamentous red seaweeds, sponges and *Balanus crenatus* on tide-swept variable salinity infralittoral rock.	SIR.K.LsacRS.FiR
	Laminaria saccharina and *Psammechinus miliaris* on slightly reduced salinity grazed infralittoral rock.	SIR.K.LsacRS.Psa
	Laminaria saccharina with *Phyllophora* spp. and filamentous green seaweeds on reduced or low salinity infralittoral rock.	SIR.K.LsacRS.Phy
***Mytilus edulis* beds on reduced salinity tide-swept infralittoral rock.**		**SIR.EstFa.MytT**
***Cordylophora caspia* and *Electra crustulenta* on reduced salinity infralittoral rock.**		**SIR.EstFa.CorEle**
***Hartlaubella gelatinosa* and *Conopeum reticulum* on low salinity infralittoral mixed substrata.**		**SIR.EstFa.HarCon**
Mixed fucoids, *Chorda filum* and green seaweeds on reduced salinity infralittoral rock.		**SIR.Lag.FChoG**
***Ascophyllum nodosum* with epiphytic sponges and ascidians on variable salinity infralittoral rock.**		**SIR.Lag.AscSAs**
***Polyides rotundus* and/or *Furcellaria lumbricalis* on reduced salinity infralittoral rock.**		**SIR.Lag.PolFur**

INFRALITTORAL ROCK (other)

Biotope name		Biotope code
***Alcyonium digitatum* and a bryozoan, hydroid and ascidian turf on moderately exposed vertical infralittoral rock.**		**IR.FaSwV.AlcBytH**
Represents:	*Corynactis viridis*, *Metridium senile* and *Alcyonium digitatum* on exposed or moderately exposed vertical infralittoral rock.	IR.FaSwV.CorMetAlc
	Hiatella arctica, bryozoans and ascidians on vertical infralittoral soft rock.	IR.FaSwV.AlcByH.Hia
	Alcyonium digitatum with dense *Tubularia indivisa* and anemones on strongly tide-swept circalittoral rock.	ECR.Alc.AlcTub
	Alcyonium digitatum with massive sponges (*Cliona celata* and *Pachymatisma johnstonia*) and *Nemertesia antennina* on moderately tide-swept exposed circalittoral rock.	ECR.Alc.AlcMaS
	Alcyonium digitatum with *Securiflustra securifrons* on weakly tide-swept or scoured moderately exposed circalittoral rock.	ECR.Alc.AlcSec
	Alcyonium digitatum, Pomatoceros triqueter, algal and bryozoan crusts on vertical exposed circalittoral rock.	ECR.Alc.AlcC
	Coralline crusts, *Parasmittina trispinosa*, *Caryophyllia smithii*, *Haliclona viscosa*, polyclinids and sparse *Corynactis viridis* on very exposed circalittoral rock.	ECR.Efa.CCParCar
	Corynactis viridis and a crisiid/*Bugula*/*Cellaria* turf on steep or vertical exposed circalittoral rock.	ECR.Efa.CoCri
	Balanus crenatus and *Tubularia indivisa* on extremely tide-swept circalittoral rock.	ECR.BS.BalTub
	Tubularia indivisa, sponges and other hydroids on tide-swept circalittoral bedrock.	ECR.BS.TubS
	Balanus crenatus, *Halichondria panicea* and *Alcyonidium diaphanum* on extremely tide-swept sheltered circalittoral rock.	ECR.BS.BalHpan
	Cushion sponges, hydroids and ascidians on very tide-swept sheltered circalittoral rock.	ECR.BS.CuSH

CIRCALITTORAL ROCK (and other hard substrata)

EXPOSED CIRCALITTORAL ROCK

Biotope name		Biotope code
***Pomatoceros triqueter*, *Balanus crenatus* and bryozoan crusts on mobile circalittoral cobbles and pebbles.**		**ECR.Efa.PomByC**
Represents:	*Balanus crenatus* and/or *Pomatoceros triqueter* with spirorbid worms and coralline crusts on severely scoured infralittoral rock.	EIR.SG.CC
	Balanus crenatus and/or *Pomatoceros triqueter* with spirorbid worms and coralline crusts on severely scoured vertical infralittoral rock.	EIR.SG.CC.BalPom
	Coralline crusts and crustaceans on mobile boulders and cobbles in surge gullies.	EIR.SG.CC.Mob
***Halichondria bowerbanki*, *Eudendrium arbusculum* and *Eucratea loricata* on reduced salinity tide-swept circalittoral mixed substrata.**		**ECR.BS.HbowEud**

MODERATELY EXPOSED CIRCALITTORAL ROCK

Biotope name		Biotope code
Erect sponges, *Eunicella verrucosa* and *Pentapora fascialis* on slightly tide-swept moderately exposed circalittoral rock.		**MCR.Xfa.ErSEun**
Represents:	*Phakellia ventilabrum* and axinellid sponges on deep exposed circalittoral rock.	MCR.Xfa.PhaAxi
	Cushion sponges (*Polymastia boletiformis*, *Tethya*), stalked sponges, *Nemertesia* spp. and *Pentapora fascialis* on moderately exposed circalittoral rock.	MCR.Xfa.ErSPbolSH
	Erect sponges and *Swiftia pallida* on slightly tide-swept moderately exposed circalittoral rock.	MCR.Xfa.ErSSwi
***Flustra foliacea* and other hydroid/bryozoan turf species on slightly scoured circalittoral rock or mixed substrata.**		**MCR.ByH.Flu**
Represents:	Sparse sponges, *Nemertesia* spp., *Alcyonidium diaphanum* and *Bowerbankia* spp. on circalittoral mixed substrata.	MCR.ByH.SnemAdia
	Flustra foliacea on slightly scoured silty circalittoral rock or mixed substrata	MCR.ByH.Flu.Flu
	Flustra foliacea with hydroids, bryozoans and sponges on slightly tide-swept circalittoral mixed substrata.	MCR.ByH.Flu.HbyS
	Sertularia argentea, *S. cupressina* and *Hydrallmania falcata* on tide-swept circalittoral cobbles and pebbles.	MCR.ByH.Flu.SerHyd
	Haliclona oculata and *Flustra foliacea* with a rich faunal turf on tide-swept sheltered circalittoral boulders or cobbles.	MCR.ByH.Flu.Hocu
***Urticina felina* on sand-affected circalittoral rock.**		**MCR.ByH.Urt**
Represents:	*Urticina felina* on sand-scoured circalittoral rock.	MCR.ByH.Urt.Urt
	Urticina felina and *Ciocalypta penicillus* on sand-covered circalittoral rock.	MCR.ByH.Urt.Cio
***Sabellaria spinulosa* crusts on silty turbid circalittoral rock.**		**MCR.Csab.Sspi**
***Mytilus edulis* beds with hydroids and ascidians on tide-swept moderately exposed circalittoral rock.**		**MCR.M.MytHAs**
***Musculus discors* beds on moderately exposed circalittoral rock.**		**MCR.M.Mus**
***Modiolus modiolus* beds with hydroids and red seaweeds on tide-swept circalittoral mixed substrata.**		**MCR.M.ModT**
Represents:	*Modiolus modiolus* beds with *Chlamys varia*, sponges, hydroids and bryozoans on slightly tide-swept very sheltered circalittoral mixed substrata.	SCR.Mod.ModCvar
	Modiolus modiolus beds with fine hydroids and large solitary ascidians on very sheltered circalittoral mixed substrata.	SCR.Mod.ModHAs
	Modiolus modiolus beds on circalittoral mixed sediment.	CMX.ModMx
***Ophiothrix fragilis* and/or *Ophiocomina nigra* beds on slightly tide-swept circalittoral rock or mixed substrata.**		**MCR.Bri.Oph**
Represents:	*Ophiopholis aculeata* beds on slightly tide-swept circalittoral rock or mixed substrata.	MCR.Bri.Oph.Oacu
Faunal and algal crusts, *Echinus esculentus*, sparse *Alcyonium digitatum,* and grazing-tolerant fauna on moderately exposed circalittoral rock.		**MCR.GzFa.FaAlC**
Represents:	Faunal and algal crusts, *Echinus esculentus*, sparse *Alcyonium digitatum*, *Abietinaria abietina* and other grazing-tolerant fauna on moderately exposed circalittoral rock.	MCR.GzFa.FaAlC.Abi

Biotope name		Biotope code
***Molgula manhattensis* and *Polycarpa* spp. with erect sponges on tide-swept moderately exposed circalittoral rock.**		**MCR.As.MolPol**
Represents:	*Stolonica socialis* and/or *Polyclinum aurantium* with *Flustra foliacea* on slightly sand-scoured tide-swept moderately exposed circalittoral rock.	MCR.As.Sto.Paur
	Dense ascidians, bryozoans and hydroids on a crust of *Sabellaria spinulosa* on tide-swept circalittoral rock.	MCR.As.MolPol.Sab
Piddocks with a sparse associated fauna in upward-facing circalittoral very soft chalk or clay.		**MCR.SfR.Pid**
***Polydora* sp. tubes on upward-facing circalittoral soft rock.**		**MCR.SfR.Pol**

SHELTERED CIRCALITTORAL ROCK

Biotope name		Biotope code
***Antedon* spp., solitary ascidians and fine hydroids on sheltered circalittoral rock.**		**SCR.BrAs.AntAsH**
***Suberites* spp. and other sponges with solitary ascidians on very sheltered circalittoral rock.**		**SCR.BrAS.SubSoAs**
Represents:	Solitary ascidians, including *Ascidia mentula* and *Ciona intestinalis*, on very sheltered circalittoral rock.	SCR.BrAS.Amen.Cio
	Large *Metridium senile* and solitary ascidians on grazed very sheltered circalittoral rock.	SCR.BrAS.AmenCio.Met
	Ascidiella aspersa on sheltered circalittoral rocks on muddy sediment.	SCR.BrAS.Aasp
***Neocrania anomala* and *Protanthea simplex* on very sheltered circalittoral rock.**		**SCR.BrAs.NeoPro**
Represents:	Brachiopods, calcareous tubeworms (*Placostegus tridentatus*, *Hydroides*) and sponges on variable salinity circalittoral rock.	SCR.BrAs.NeoPro.CaTw

CIRCALITTORAL ROCK (other)

Biotope name		Biotope code
***Bugula* spp. and other bryozoans on vertical moderately exposed circalittoral rock.**		**CR.FaV.Bug**
Represents:	*Antedon bifida* and a bryozoan/hydroid turf on steep or vertical circalittoral rock.	CR.FaV.Ant
Caves and overhangs (deep)		**CR.Cv**
Represents:	Sponges, cup corals and *Parerythropodium coralloides* on shaded or overhanging circalittoral rock.	CR.Cv.Scup

CIRCALITTORAL OFFSHORE ROCK (AND OTHER HARD SUBSTRATA)

Biotope name	Biotope code
***Lophelia* reefs.**	**COR.Lop**

SUBLITTORAL SEDIMENTS

INFRALITTORAL GRAVELS AND SANDS

Biotope name		Biotope code
***Phymatolithon calcareum* maerl beds with hydroids and echinoderms in deeper infralittoral clean gravel or coarse sand.**		**IGS.Mrl.Phy.HEc**
Represents:	*Phymatolithon calcareum* maerl beds with red seaweeds in shallow infralittoral clean gravel or coarse sand.	IGS.Mrl.Phy.R
	Lithothamnion corallioides maerl beds on infralittoral muddy gravel.	IMX.Mrl.Mx.Lcor
	Lithothamnion fasciculatum maerl beds with *Chlamys varia* on infralittoral sandy mud or mud.	IMX.MrlMx.Lfas
	Lithothamnion dentatum maerl beds on infralittoral muddy sediment.	IMX.MrlMx.Lden
***Lithothamnion glaciale* maerl beds in tide-swept variable salinity infralittoral gravel.**		**IGSMrl.Lgla**
***Halcampa chrysanthellum* and *Edwardsia timida* on sublittoral clean stone gravel.**		**IGS.FaG.HalEdw**
***Nephtys cirrosa* and *Bathyporeia* spp. in infralittoral sand.**		**IGS.FaS.NcirBat**
Represents:	Sparse fauna in infralittoral mobile clean sand.	IGS.FaS.Mob
Dense *Lanice conchilega* and other polychaetes in tide-swept infralittoral sand.		**IGS.FaS.Lcon**
***Fabulina fabula* and *Magelona mirabilis* with venerid bivalves in infralittoral compacted fine sand.**		**IGS.FaS.FabMag**
Represents:	*Spisula elliptica* and venerid bivalves in infralittoral clean sand or shell gravel.	IGS.FaG.Sell
***Neomysis integer* and *Gammarus* spp. in low salinity infralittoral mobile sand.**		**IGS.EstGS.NeoGam**
Represents:	*Nephtys cirrosa* and fluctuating salinity-tolerant fauna in reduced salinity infralittoral mobile sand.	IGS.EstGS.Ncir
	Sparse fauna in reduced salinity infralittoral mobile sand.	IGS.EstGS.MobRS

CIRCALITTORAL GRAVELS AND SANDS

Biotope name		Biotope code
Venerid bivalves in circalittoral coarse sand or gravel.		**CGS.Ven**
Represents:	*Neopentadactyla mixta* and venerid bivalves in circalittoral shell gravel or coarse sand.	CGS.Ven.Neo
	Venerid bivalves and *Branchiostoma lanceolatum* in circalittoral coarse sand with shell gravel.	CGS.Ven.Bra

INFRALITTORAL MUDDY SANDS

Biotope name	Biotope code
***Zostera marina/angustifolia* beds in lower shore or infralittoral clean or muddy sand.**	**IMS.Sgr.Zmar**
***Ruppia maritima* in reduced salinity infralittoral muddy sand.**	**IMS.Sgr.Rup**
***Echinocardium cordatum* and *Ensis* sp. in lower shore or shallow sublittoral muddy fine sand.**	**IMS.FaMS.EcorEns**
***Macoma balthica* and *Abra alba* in infralittoral muddy sand or mud.**	**IMS.FaMS.MacAbr**
***Capitella capitata* in enriched sublittoral muddy sediments.**	**IMS.FaMS.Cap**

CIRCALITTORAL MUDDY SANDS

Biotope name		Biotope code
***Abra alba*, *Nucula nitida* and *Corbula gibba* in circalittoral muddy sand or slightly mixed sediment.**		**CMS.AbrNucCor**
***Amphiura filiformis* and *Echinocardium cordatum* in circalittoral clean or slightly muddy sand.**		**CMS.AfilEcor**
***Virgularia mirabilis* and *Ophiura* spp. on circalittoral sandy or shelly mud.**		**CMS.VirOph**
Represents:	*Virgularia mirabilis* and *Ophiura* spp. with hydroids and ascidians on circalittoral sandy or shelly mud with shells or stones.	CMS.VirOph.HAs
***Serpula vermicularis* reefs on very sheltered circalittoral muddy sand.**		**CMS.Ser**

INFRALITTORAL MUDS

Biotope name	Biotope code
***Potamogeton pectinatus* community.**	**IMU.Ang.NVC A12**
***Phragmites australis* swamp and reed beds.**	**IMU.Ang.NVC S4**
Semi-permanent tube-building amphipods and polychaetes in sublittoral mud or muddy sand.	**IMU.MarMu.TubeAP**
***Arenicola marina* and synaptid holothurians in extremely shallow soft mud.**	**IMU.MarMu.AreSyn**
***Philine aperta* and *Virgularia mirabilis* in soft stable infralittoral mud.**	**IMU.MarMu.PhiVir**
***Ocnus planci* aggregations on sheltered sublittoral muddy sediment.**	**IMU.MarMu.Ocn**
***Polydora ciliata* in variable salinity infralittoral firm mud or clay.**	**IMU.EstMu.PolVS**

Biotope name		Biotope code
***Aphelochaeta marioni* and *Tubificoides* spp. in variable salinity infralittoral mud.**		**IMU.EstMu.AphTub**
Represents:	*Nephtys hombergii* and *Tubificoides* spp. in variable salinity infralittoral soft mud.	IMU.EstMu.NhomTub
	Infralittoral fluid mobile mud.	IMU.EstMu.MobMud
	Capitella capitata and *Tubificoides* spp. in reduced salinity infralittoral muddy sediment.	IMU.EstMu.CapTub
	Tubificoides spp. in reduced salinity infralittoral muddy sediment.	IMU.EstMu.Tub
***Limnodrilus hoffmeisteri*, *Tubifex tubifex* and *Gammarus* spp. in low salinity infralittoral muddy sediment.**		**IMU.EstMu.LimTtub**

CIRCALITTORAL MUDS

Biotope name		Biotope code
***Brissopsis lyrifera* and *Amphiura chiajei* in circalittoral mud.**		**CMU.BriAchi**
Seapens and burrowing megafauna in circalittoral soft mud.		**CMU.SpMeg**
Represents:	Seapens, including *Funiculina quadrangularis*, and burrowing megafauna in undisturbed circalittoral soft mud.	CMU.SpMeg.Fun
***Beggiatoa* spp. on anoxic sublittoral mud.**		**CMU.Beg**

INFRALITTORAL MIXED SEDIMENT

Biotope name		Biotope code
***Laminaria saccharina*, *Chorda filum* and filamentous red seaweeds on sheltered infralittoral sediment.**		**IMX.KSwMx.LsacX**
Represents:	Mats of *Trailliella* on infralittoral muddy gravel.	IMX.KSwMx.Tra
	Loose-lying mats of *Phyllophora crispa* on infralittoral muddy sediment.	IMX.KSwMx.Pcri
Filamentous green seaweeds on low salinity infralittoral mixed sediment or rock.		**IMX.KSwMx.FiG**
***Ostrea edulis* beds on shallow sublittoral muddy sediment.**		**IMX.Oy.Ost**
***Venerupis senegalensis* and *Mya truncata* in lower shore or infralittoral muddy gravel.**		**IMX.FaMx.VsenMtru**
Burrowing anemones in sublittoral muddy gravel.		**IMX.FaMx.An**
***Limaria hians* beds in tide-swept sublittoral muddy mixed sediment.**		**IMX.FaMx.Lim**
***Crepidula fornicata* and *Aphelochaeta marioni* in variable salinity infralittoral mixed sediment.**		**IMX.EstMx.CreAph**
***Mytilus edulis* beds in variable salinity infralittoral mixed sediment.**		**IMX.EstMx.MytV**
***Polydora ciliata*, *Mya truncata* and solitary ascidians in variable salinity infralittoral mixed sediment.**		**IMX.EstMx.PolMtru**

CIRCALITTORAL OFFSHORE SEDIMENTS

Biotope name	Biotope code
***Ampharete falcata* turf with *Parvicardium ovale* on cohesive muddy very fine sand near margins of deep stratified seas.**	**COS.AmpPar**
Foramaniferans and *Thyasira* sp. in deep circalittoral soft mud.	**COS.ForThy**
***Styela gelatinosa* and other solitary ascidians on sheltered deep circalittoral muddy sediment.**	**COS.Sty**

Appendix 4 Species selected as indicative of the sensitivity of the biotopes researched. For each species the type of information review is given: Full = a full biology and sensitivity Key Information review has been completed, while Basic = basic information only. Not all the species information is on-line at the time of writing.

Biotope name	Code	Community Importance	Species	Species review type
Abra alba, *Nucula nitida* and *Corbula gibba* in circalittoral muddy sand or slightly mixed sediment	CMS.AbrNucCor	Important characterizing	*Lagis koreni*	Basic
		Important characterizing	*Nephtys hombergii*	Full
		Important characterizing	*Corbula gibba*	Basic
		Important characterizing	*Abra alba*	Full
		Important characterizing	*Nucula nitidosa*	Basic
		Important other	*Echinocardium cordatum*	Full
Amphiura filiformis and *Echinocardium cordatum* in circalittoral clean or slightly muddy sand	CMS.AfilEcor	Key functional	*Amphiura filiformis*	Full
		Key functional	*Echinocardium cordatum*	Full
		Important structural	*Callianassa subterranea*	Full
Serpula vermicularis reefs on very sheltered circalittoral muddy sand	CMS.Ser	Key structuring	*Serpula vermicularis*	Basic
Virgularia mirabilis and *Ophiura* spp. on circalittoral sandy or shelly mud	CMS.VirOph	Important characterizing	*Virgularia mirabilis*	Full
		Important characterizing	*Amphiura filiformis*	Full
		Important other	*Pecten maximus*	Full
Beggiatoa spp. on anoxic sublittoral mud	CMU.Beg	Important characterizing	*Beggiatoa* spp.	None
Brissopsis lyrifera and *Amphiura chiajei* in circalittoral mud	CMU.BriAchi	Key functional	*Brissopsis lyrifera*	Full
		Important characterizing	*Amphiura chiajei*	Full
		Important other	*Calocaris macandreae*	Basic
		Important other	*Nephrops norvegicus*	Basic
Seapens and burrowing megafauna in circalittoral soft mud	CMU.SpMeg	Key functional	*Callianassa subterranea*	Full
		Important characterizing	*Virgularia mirabilis*	Full
		Important functional	*Liocarcinus depurator*	Basic
		Important functional	*Amphiura filiformis*	Full
Foraminiferans and *Thyasira* sp. in deep circalittoral soft mud	COS.ForThy	Important characterizing	Foraminifera	None
		Important characterizing	*Thyasira* sp.	None
		Important functional	Polychaeta	N/A
Styela gelatinosa and other solitary ascidians on very sheltered deep circalittoral muddy sediment	COS.Sty	Key structuring	*Pseudamussium septemradiatum*	None
		Key functional	*Asterias rubens*	Full
		Important characterizing	*Styela gelatinosa*	Basic
		Important characterizing	*Abra alba*	Full
		Important characterizing	*Ascidiella scabra*	Full
		Important characterizing	*Metridium senile*	Full

Biotope name	Code	Community Importance	Species	Species review type
Bugula spp. and other bryozoans on vertical moderately exposed circalittoral rock	CR.Bug	Important characterizing	*Bugula turbinata*	Full
		Important characterizing	*Bugula flabellata*	Basic
		Important characterizing	*Bugula plumosa*	Basic
		Important Structural	*Clavelina lepadiformis*	Full
		Important structural	*Halichondria panicea*	Full
		Important structural	*Morchellium argus*	Full
		Important structural	*Nemertesia ramosa*	Full
		Important functional	*Asterias rubens*	Full
		Important functional	*Echinus esculentus*	Full
Caves and overhangs (deep)	CR.Cv	Important characterizing	*Alcyonium glomeratum*	Basic
		Important characterizing	*Leptopsammia pruvoti*	Full
		Important characterizing	*Caryophyllia smithii*	Basic
Halichondria bowerbanki, *Eudendrium arbusculum* and *Eucratea loricata* on reduced salinity tide-swept circalittoral mixed substrata	ECR.HbowEud	Important characterizing	*Alcyonidium diaphanum*	Basic
		Important characterizing	*Metridium senile*	Full
		Important characterizing	*Halichondria bowerbanki*	Full
		Important structural	*Ascidiella scabra*	Full
		Important structural	*Balanus crenatus*	Full
		Important structural	*Asterias rubens*	Full
Pomatoceros triqueter, *Balanus crenatus* and bryozoan crusts on mobile circalittoral cobbles and pebbles	ECR.PomByC	Important characterizing	*Pomatoceros triqueter*	Full
		Important characterizing	*Balanus crenatus*	Full
Alaria esculenta on exposed sublittoral fringe bedrock	EIR.Ala	Key structuring	*Alaria esculenta*	Full
		Important characterizing	*Corallina officinalis*	Full
Foliose red seaweeds on exposed or moderately exposed lower infralittoral rock	EIR.FoR	Important characterizing	*Lithophyllum incrustans*	Full
		Important characterizing	*Delesseria sanguinea*	Full
		Important other	*Alcyonium digitatum*	Full
		Important other	*Calliostoma zizyphinum*	Basic
		Important other	*Clavelina lepadiformis*	Full
		Important other	*Echinus esculentus*	Full
		Important other	*Nemertesia antennina*	Basic
		Important other	*Urticina felina*	Full

Biotope name	Code	Community Importance	Species	Species review type
Laminaria hyperborea forest with a faunal cushion (sponges and polyclinids) and foliose red seaweeds on very exposed upper infralittoral rock	EIR.LhypFa	Key structuring	*Laminaria hyperborea*	Full
		Important characterizing	*Alcyonium digitatum*	Full
		Important characterizing	*Botryllus schlosseri*	Full
		Important characterizing	*Delesseria sanguinea*	Full
		Important characterizing	*Halichondria panicea*	Full
		Important characterizing	*Urticina felina*	Full
		Important structural	*Echinus esculentus*	Full
Laminaria hyperborea with dense foliose red seaweeds on exposed infralittoral rock	EIR.LhypR	Key structuring	*Laminaria hyperborea*	Full
		Key functional	*Echinus esculentus*	Full
		Key functional	*Helcion pellucidum*	Full
		Important characterizing	*Delesseria sanguinea*	Full
Laminaria saccharina and/or *Saccorhiza polyschides* on exposed infralittoral rock	EIR.LsacSac	Key structuring	*Laminaria saccharina*	Full
		Key structuring	*Saccorhiza polyschides*	Full
		Important functional	*Echinus esculentus*	Full
		Important functional	*Lithophyllum incrustans*	Full
Sponge crusts and anemones on wave-surged vertical infralittoral rock	EIR.SCAn	Key structuring	*Alcyonium digitatum*	Full
		Key functional	*Echinus esculentus*	Full
		Key structuring	*Laminaria hyperborea*	Full
		Key structuring	*Metridium senile*	Full
		Important functional	*Asterias rubens*	Full
		Important other	*Botryllus schlosseri*	Full
		Important other	*Halichondria panicea*	Full
Barnacles and *Patella* spp. on exposed or moderately exposed, or vertical sheltered, eulittoral rock	ELR.BPat	Key structuring	*Patella vulgata*	Full
		Key structuring	*Semibalanus balanoides*	Full
		Important functional	*Nucella lapillus*	Full
Corallina officinalis on very exposed lower eulittoral rock	ELR.Coff	Key structuring	*Corallina officinalis*	Full
		Important functional	*Idotea pelagica*	Basic
		Important functional	Gammaridae	N/A
Fucus distichus and *Fucus spiralis* f. *nana* on extremely exposed upper shore rock	ELR.Fdis	Key structuring	*Fucus distichus*	Full
		Key structuring	*Fucus spiralis*	Full

Biotope name	Code	Community Importance	Species	Species review type
Himanthalia elongata and red seaweeds on exposed lower eulittoral rock	ELR.Him	Important characterizing	*Patella vulgata*	Full
		Important characterizing	*Semibalanus balanoides*	Full
		Important characterizing	*Himanthalia elongata*	Full
		Important characterizing	*Palmaria palmata*	Full
		Important characterizing	*Chondrus crispus*	Full
		Important characterizing	*Corallina officinalis*	Full
		Important other	*Mytilus edulis*	Full
		Important other	*Nucella lapillus*	Full
Mytilus edulis and barnacles on very exposed eulittoral rock	ELR.MytB	Key structuring	*Mytilus edulis*	Full
		Key functional	*Patella vulgata*	Full
		Key structuring	*Semibalanus balanoides*	Full
		Important functional	*Nucella lapillus*	Full
		Important other	*Corallina officinalis*	Full
		Important other	*Palmaria palmata*	Full
Fabulina fabula and *Magelona mirabilis* with venerid bivalves in infralittoral compacted fine sand	IGS.FabMag	Important characterizing	*Fabulina fabula*	Full
		Important characterizing	*Magelona mirabilis*	Full
		Important other	*Chamelea gallina*	None
Halcampa chrysanthellum and *Edwardsia timida* on sublittoral clean stone gravel	IGS.HalEdw	Important characterizing	*Halcampa chrysanthellum*	Basic
		Important characterizing	*Edwardsia timida*	Basic
Dense *Lanice conchilega* and other polychaetes in tide-swept infralittoral sand	IGS.Lcon	Key structuring	*Lanice conchilega*	Full
		Important characterizing	*Arenicola marina*	Full
		Important other	*Abra alba*	Full
Lithothamnion glaciale maerl beds in tide-swept variable salinity infralittoral gravel	IGS.Lgla	Key structuring	*Lithothamnion glaciale*	Full
		Important functional	*Ophiothrix fragilis*	Full
		Important functional	*Psammechinus miliaris*	Full
Nephtys cirrosa and *Bathyporeia* spp. in infralittoral sand	IGS.NcirBat	Important characterizing	*Bathyporeia pelagica*	Full
		Important characterizing	*Nephtys cirrosa*	Basic
Neomysis integer and *Gammarus* spp. in low salinity infralittoral mobile sand	IGS.NeoGam	Important characterizing	*Gammarus salinus*	Full
		Important characterizing	*Gammarus zaddachi*	Basic
		Important characterizing	*Neomysis integer*	Full
Phymatolithon calcareum maerl beds with hydroids and echinoderms in deeper infralittoral clean gravel or coarse sand	IGS.Phy.HEc	Key structuring	*Phymatolithon calcareum*	Full
		Important characterizing	*Neopentadactyla mixta*	Full
		Important characterizing	*Nemertesia ramosa*	Full

Biotope name	Code	Community Importance	Species	Species review type
Capitella capitata in enriched sublittoral muddy sediments	IMS.Cap	Key functional	*Capitella capitata*	Full
Echinocardium cordatum and *Ensis* spp. in lower shore or shallow sublittoral muddy fine sand.	IMS.EcorEns	Key functional	*Echinocardium cordatum*	Full
		Key functional	*Ensis* spp.	Full
		Important characterizing	*Liocarcinus depurator*	Basic
Macoma balthica and *Abra alba* in infralittoral muddy sand or mud	IMS.MacAbr	Key functional	*Macoma balthica*	Full
		Key functional	*Abra alba*	Full
		Important characterizing	*Lagis koreni*	Basic
		Important characterizing	*Nephtys hombergii*	Full
		Important functional	*Echinocardium cordatum*	Full
		Important functional	*Fabulina fabula*	Full
		Important other	*Crangon crangon*	Basic
Ruppia maritima in reduced salinity infralittoral muddy sand	IMS.Rup	Key structuring	*Ruppia maritima*	Basic
		Key structuring	*Ruppia cirrhosa*	Basic
		Important functional	*Gammarus* spp.	N/A
		Important functional	*Hydrobia ulvae*	Full
		Important other	*Pomatoschistus minutus*	Full
		Important other	*Cerastoderma glaucum*	Full
		Important other	*Arenicola marina*	Full
Zostera marina/angustifolia beds in lower shore or infralittoral clean or muddy sand	IMS.Zmar	Key structuring	*Zostera marina*	Full
		Important structural	*Hydrobia ulvae*	Full
		Important structural	*Lacuna vincta*	Full
Aphelochaeta marioni and *Tubificoides* spp. in variable salinity infralittoral mud	IMU.AphTub	Key structuring	*Polydora ciliata*	Full
		Important characterizing	*Aphelochaeta marioni*	Full
		Important other	*Hydrobia ulvae*	Full
		Important other	*Hediste diversicolor*	Full
		Important other	*Lanice conchilega*	Full
Arenicola marina and synaptid holothurians in extremely shallow soft mud.	IMU.AreSyn	Important characterizing	*Arenicola marina*	Full
		Important characterizing	*Labidoplax media*	Basic
		Important characterizing	*Leptosynapta bergensis*	None
Limnodrilus hoffmeisteri, *Tubifex tubifex* and *Gammarus* spp. in low salinity infralittoral muddy sediment	IMU.LimTtub	Key functional	*Limnodrilus hoffmeisteri*	Basic
		Key functional	*Tubifex tubifex*	Basic
		Important other	*Gammarus* spp.	Basic

Biotope name	Code	Community Importance	Species	Species review type
Potamogeton pectinatus community	IMU.NVC_A12	Key structuring	*Potamogeton pectinatus*	Basic
		Important functional	*Gammarus salinus*	Full
		Important functional	*Gammarus insensibilis*	Full
		Important functional	*Hydrobia ulvae*	Full
		Important other	*Conopeum reticulum*	Full
		Important other	*Cordylophora caspia*	Full
		Important other	*Neomysis integer*	Full
		Important other	*Pomatoschistus minutus*	Full
Phragmites australis swamp and reed beds	IMU.NVC_S4	Key structuring	*Phragmites australis*	Basic
		Important functional	*Gammarus insensibilis*	Full
		Important functional	*Gammarus salinus*	Full
		Important functional	*Hydrobia ulvae*	Full
		Important other	*Neomysis integer*	Full
Ocnus planci aggregations on sheltered sublittoral muddy sediment	IMU.Ocn	Important characterizing	*Ocnus planci*	Basic
Philine aperta and *Virgularia mirabilis* in soft stable infralittoral mud	IMU.PhiVir	Important characterizing	*Philine aperta*	Full
		Important characterizing	*Virgularia mirabilis*	Full
		Important other	*Amphiura filiformis*	Full
Polydora ciliata in variable salinity infralittoral firm mud or clay	IMU.PolVS	Key functional	*Polydora ciliata*	Full
Semi-permanent tube-building amphipods and polychaetes in sublittoral mud or muddy sand	IMU.TubeAP	Key functional	*Spiophanes bombyx*	Full
		Key functional	*Polydora ciliata*	Full
		Important characterizing	*Ampelisca* spp.	N/A
		Important characterizing	*Corophium* spp.	N/A
		Important characterizing	*Haploops tubicola*	None
Crepidula fornicata and *Aphelochaeta marioni* in variable salinity infralittoral mixed sediment	IMX.CreAph	Important characterizing	*Aphelochaeta marioni*	Full
		Important characterizing	*Crepidula fornicata*	Full
Filamentous green seaweeds on low salinity infralittoral mixed sediment or rock	IMX.FiG	Key structuring	*Arenicola marina*	Full
		Key structuring	*Chaetomorpha linum*	Basic
		Key structuring	*Enteromorpha intestinalis*	Full
		Important characterizing	*Gasterosteus aculeatus*	Basic
		Important characterizing	*Neomysis integer*	Full
		Important functional	*Mytilus edulis*	Full
		Important functional	*Asterias rubens*	Full

Biotope name	Code	Community Importance	Species	Species review type
Limaria hians beds in tide-swept sublittoral muddy mixed sediment	IMX.Lim	Key structuring	*Limaria hians*	Basic
Laminaria saccharina, *Chorda filum* and filamentous red seaweeds on sheltered infralittoral sediment	IMX.LsacX	Important characterizing	*Chorda filum*	Full
		Important characterizing	*Laminaria saccharina*	Full
		Important functional	*Asterias rubens*	Full
		Important other	*Arenicola marina*	Full
Mytilus edulis beds on variable salinity infralittoral mixed sediment	IMX.MytV	Key structuring	*Mytilus edulis*	Full
		Important functional	*Asterias rubens*	Full
		Important functional	*Nucella lapillus*	Full
Ostrea edulis beds on shallow sublittoral muddy sediment	IMX.Ost	Key structuring	*Ostrea edulis*	Full
Polydora ciliata, *Mya truncata* and solitary ascidians in variable salinity infralittoral mixed sediment.	IMX.PolMtru	Important characterizing	*Aphelochaeta marioni*	Full
		Important characterizing	*Mya arenaria*	Full
		Important characterizing	*Mya truncata*	Basic
		Important characterizing	*Polydora ciliata*	Full
		Important other	*Ascidiella scabra*	Full
		Important other	*Molgula manhattensis*	Full
Venerupis senegalensis and *Mya truncata* in lower shore or infralittoral muddy gravel	IMX.VsenMtru	Important characterizing	*Venerupis senegalensis*	Full
		Important other	*Arenicola marina*	Full
		Important other	*Littorina littorea*	Full
		Important other	*Mya truncata*	Basic
Alcyonium digitatum with a bryozoan, hydroid and ascidian turf on moderately exposed vertical infralittoral rock	IR.AlcByH	Key structuring	*Alcyonium digitatum*	Full
		Important characterizing	*Clavelina lepadiformis*	Full
		Important characterizing	*Halichondria panicea*	Full
		Important characterizing	*Nemertesia ramosa*	Full
Burrowing amphipods and *Eurydice pulchra* in well-drained clean sand shores	LGS.Aeur	Important characterizing	*Bathyporeia pelagica*	Full
		Important characterizing	*Eurydice pulchra*	Full
Dense *Lanice conchilega* in tide-swept lower shore sand	LGS.Lan	Key structuring	*Lanice conchilega*	Full
		Important characterizing	*Cerastoderma edule*	Full
		Important characterizing	*Nephtys cirrosa*	Basic
		Important characterizing	*Nephtys hombergii*	Full
Pectenogammarus planicrurus in mid shore well-sorted gravel or coarse sand	LGS.Pec	Important characterizing	*Pectenogammarus planicrurus*	Basic

Biotope name	Code	Community Importance	Species	Species review type
Talitrid amphipods in decomposing seaweed on the strand-line	LGS.Tal	Important characterizing	*Talitrus saltator*	Full
Zostera noltii beds in upper to mid shore muddy sand	LMS.Znol	Key structuring	*Zostera noltii*	Full
		Important functional	*Hydrobia ulvae*	Full
		Important functional	*Littorina littorea*	Full
		Important other	*Arenicola marina*	Full
		Important other	*Cerastoderma edule*	Full
Hediste diversicolor and *Macoma balthica* in sandy mud shores	LMU.HedMac	Important characterizing	*Hediste diversicolor*	Full
		Important characterizing	*Macoma balthica*	Full
		Important other	*Aphelochaeta marioni*	Full
		Important other	*Cerastoderma edule*	Full
Puccinellia maritima saltmarsh community	LMU.NVC_SM13	Key structuring	*Puccinellia maritima*	Basic
		Important characterizing	*Armeria maritima*	Basic
		Important characterizing	*Glaux maritima*	None
		Important characterizing	*Limonium vulgare*	None
		Important characterizing	*Plantago maritima*	None
		Important characterizing	*Salicornia* agg.	Non
Corallina officinalis and coralline crusts in shallow eulittoral rockpools.	LR.Cor	Key structuring	*Corallina officinalis*	Full
		Important characterizing	*Lithophyllum incrustans*	Full
		Important structural	*Gibbula cineraria*	Basic
		Important structural	*Hyale prevostii*	Full
		Important structural	*Littorina littorea*	Full
		Important structural	*Patella vulgata*	Full
Green seaweeds (*Enteromorpha* spp. and *Cladophora* spp.) in upper shore rockpools	LR.G	Key structuring	*Cladophora rupestris*	Full
		Key structuring	*Enteromorpha intestinalis*	Full
		Important characterizing	*Tigriopus fulvus*	None
		Important other	*Littorina saxatilis*	Basic
		Important other	*Littorina littorea*	Basic
Overhangs and caves	LR.Ov	Important characterizing	*Morchellium argus*	Full
		Important structural	*Botryllus schlosseri*	Full
		Important structural	*Umbonula littoralis*	Full
Rhodothamniella floridula in upper littoral fringe soft rock caves	LR.RhoCv	Important characterizing	*Rhodothamniella floridula*	Full

Biotope name	Code	Community Importance	Species	Species review type
Yellow and grey lichens on supralittoral rock	LR.YG	Important characterizing	*Caloplaca marina*	Basic
		Important characterizing	*Ochrolechia parella*	Basic
		Important characterizing	*Ramalina siliquosa*	Basic
		Important characterizing	*Tephromela atra*	Basic
		Important characterizing	*Xanthoria parietina*	Basic
Erect sponges, *Eunicella verrucosa* and *Pentapora fascialis* on slightly tide-swept moderately exposed circalittoral rock.	MCR.ErSEun	Key structuring	*Eunicella verrucosa*	Full
		Important characterizing	*Axinella dissimilis*	Basic
		Important characterizing	*Pentapora fascialis*	Full
Faunal and algal crusts, *Echinus esculentus*, sparse *Alcyonium digitatum* and grazing-tolerant fauna on moderately exposed circalittoral rock	MCR.FaAlC	Key functional	*Echinus esculentus*	Full
		Important characterizing	*Alcyonium digitatum*	Full
		Important other	*Lithophyllum incrustans*	Full
		Important other	*Parasmittina trispinosa*	None
		Important other	*Pomatoceros triqueter*	Full
Flustra foliacea and other hydroid/bryozoan turf species on slightly scoured circalittoral rock or mixed substrata	MCR.Flu	Important characterizing	*Bugula turbinata*	Full
		Important characterizing	*Flustra foliacea*	Full
		Important characterizing	*Nemertesia ramosa*	Full
		Important functional	*Echinus esculentus*	Full
		Important other	*Alcyonium digitatum*	Full
		Important other	*Halichondria panicea*	Full
		Important other	*Molgula manhattensis*	Full
		Important other	*Urticina felina*	Full
Modiolus modiolus beds with hydroids and red seaweeds on tide-swept circalittoral mixed substrata	MCR.ModT	Key structuring	*Modiolus modiolus*	Full
		Important characterizing	*Alcyonium digitatum*	Full
		Important characterizing	*Ophiothrix fragilis*	Full
		Important functional	*Echinus esculentus*	Full
		Important other	*Delesseria sanguinea*	Full
Molgula manhattensis and *Polycarpa* spp. with erect sponges on tide-swept moderately exposed circalittoral rock	MCR.MolPol	Key structuring	*Molgula manhattensis*	Full
		Important characterizing	*Alcyonium digitatum*	Full
		Important characterizing	*Flustra foliacea*	Full
		Important characterizing	*Nemertesia ramosa*	Full
		Important characterizing	*Urticina felina*	Full
Musculus discors beds on moderately exposed circalittoral rock	MCR.Mus	Important characterizing	*Musculus discors*	Basic

Biotope name	Code	Community Importance	Species	Species review type
Mytilus edulis beds with hydroids and ascidians on tide-swept moderately exposed circalittoral rock	MCR.MytHAs	Key structuring	*Mytilus edulis*	Full
		Important functional	*Asterias rubens*	Full
		Important other	*Alcyonium digitatum*	Full
		Important other	*Balanus crenatus*	Full
		Important other	*Urticina felina*	Full
Ophiothrix fragilis and/or *Ophiocomina nigra* beds on slightly tide-swept circalittoral rock or mixed substrata	MCR.Oph	Key structuring	*Ophiothrix fragilis*	Full
		Important characterizing	*Alcyonium digitatum*	Full
		Important functional	*Asterias rubens*	Full
		Important characterizing	*Urticina felina*	Full
Piddocks with a sparse associated fauna in upward-facing circalittoral very soft chalk or clay	MCR.Pid	Key structuring	*Pholas dactylus*	Full
		Key functional	*Polydora ciliata*	Full
		Important characterizing	*Halichondria panicea*	Full
		Important characterizing	*Urticina felina*	Full
Polydora sp. tubes on upward-facing circalittoral soft rock	MCR.Pol	Key structuring	*Polydora ciliata*	Full
Sabellaria spinulosa crusts on silty turbid circalittoral rock	MCR.Sspi	Key structuring	*Sabellaria spinulosa*	Full
		Important characterizing	*Urticina felina*	Full
		Important functional	*Ophiothrix fragilis*	Full
Urticina felina on sand-affected circalittoral rock	MCR.Urt	Key structuring	*Balanus crenatus*	Full
		Key structuring	*Pomatoceros triqueter*	Full
		Important characterizing	*Alcyonium digitatum*	Full
		Important characterizing	*Nemertesia ramosa*	Full
		Important characterizing	*Urticina felina*	Full
		Important structural	*Flustra foliacea*	Full
		Important structural	*Pentapora fascialis*	Full
Halidrys siliquosa and mixed kelps on tide-swept infralittoral rock with coarse sediment.	MIR.HalXK	Important characterizing	*Halidrys siliquosa*	Full
		Important structural	*Aglaophenia pluma*	Basic
		Important structural	*Botryllus schlosseri*	Full
		Important structural	*Chondrus crispus*	Full
		Important structural	*Delesseria sanguinea*	Full
		Important structural	*Furcellaria lumbricalis*	Full
		Important structural	*Laminaria saccharina*	Full

Biotope name	Code	Community Importance	Species	Species review type
Laminaria digitata on moderately exposed sublittoral fringe rock	MIR.Ldig.Ldig	Key structuring	*Laminaria digitata*	Full
		Key structuring	*Lithophyllum incrustans*	Full
		Important characterizing	*Palmaria palmata*	Full
		Important functional	*Patella vulgata*	Full
Laminaria digitata and piddocks on sublittoral fringe soft rock	MIR.Ldig.Pid	Key structuring	*Laminaria digitata*	Full
		Key structuring	*Pholas dactylus*	Full
		Key functional	*Polydora ciliata*	Full
		Important characterizing	*Palmaria palmata*	Full
Grazed *Laminaria hyperborea* with coralline crusts on infralittoral rock	MIR.LhypGz	Key structuring	*Laminaria hyperborea*	Full
		Key functional	*Echinus esculentus*	Full
		Important characterizing	*Delesseria sanguinea*	Full
		Important characterizing	*Lithophyllum incrustans*	Full
		Important other	*Alcyonium digitatum*	Full
		Important other	*Antedon bifida*	Full
		Important other	*Urticina felina*	Full
Laminaria saccharina, *Chorda filum* and dense red seaweeds on shallow unstable infralittoral boulders or cobbles	MIR.LsacChoR	Key structuring	*Laminaria saccharina*	Full
		Important characterizing	*Chorda filum*	Full
		Important characterizing	*Lithophyllum incrustans*	Full
		Important other	*Delesseria sanguinea*	Full
Polyides rotundus, *Ahnfeltia plicata* and *Chondrus crispus* on sand-covered infralittoral rock	MIR.PolAhn	Important characterizing	*Ahnfeltia plicata*	Full
		Important characterizing	*Chondrus crispus*	Full
		Important characterizing	*Furcellaria lumbricalis*	Full
		Important characterizing	*Polyides rotundus*	Basic
		Important other	*Urticina felina*	Full
Sabellaria spinulosa with kelp and red seaweeds on sand-influenced infralittoral rock	MIR.SabKR	Key structuring	*Sabellaria spinulosa*	Full
		Important characterizing	*Delesseria sanguinea*	Full
		Important characterizing	*Laminaria hyperborea*	Full
		Important characterizing	*Lithophyllum incrustans*	Full
		Important characterizing	*Urticina felina*	Full
Barnacles and fucoids (moderately exposed shores)	MLR.BF	Key structuring	*Ascophyllum nodosum*	Full
		Key structuring	*Semibalanus balanoides*	Full
		Key structuring	*Fucus serratus*	Full
		Key functional	*Patella vulgata*	Full
		Important other	*Hyale prevostii*	Full

Biotope name	Code	Community Importance	Species	Species review type
Enteromorpha spp. on freshwater-influenced or unstable upper eulittoral rock	MLR.Ent	Important characterizing	*Enteromorpha intestinalis*	Full
		Important characterizing	*Porphyra* spp.	Basic
Underboulder communities	MLR.Fser.Fser.Bo	Important characterizing	*Botryllus schlosseri*	Full
		Important characterizing	*Pisidia longicornis*	Full
		Important characterizing	*Umbonula littoralis*	Full
Mytilus edulis and *Fucus vesiculosus* on moderately exposed mid eulittoral rock	MLR.MytFves	Key structuring	*Mytilus edulis*	Full
		Important structural	*Fucus vesiculosus*	Full
		Important functional	*Littorina littorea*	Full
		Important functional	*Nucella lapillus*	Full
		Important functional	*Patella vulgata*	Full
Rhodothamniella floridula on sand-scoured lower eulittoral rock	MLR.Rho	Important characterizing	*Rhodothamniella floridula*	Full
		Important functional	*Patella vulgata*	Full
		Important other	*Fucus serratus*	Full
Ceramium sp. and piddocks on eulittoral fossilised peat	MLR.RPid	Important characterizing	*Barnea candida*	Basic
		Important characterizing	*Ceramium nodulosum*	Full
		Important characterizing	*Enteromorpha intestinalis*	Full
		Important characterizing	*Petricola pholadiformis*	Basic
Sabellaria alveolata reefs on sand-abraded eulittoral rock	MLR.Salv	Key structuring	*Sabellaria alveolata*	Full
		Important structural	*Fucus serratus*	Full
		Important functional	*Littorina littorea*	Full
Antedon spp., solitary ascidians and fine hydroids on sheltered circalittoral rock	SCR.AntAsH	Important characterizing	*Antedon bifida*	Full
		Important characterizing	*Ciona intestinalis*	Full
		Important characterizing	*Clavelina lepadiformis*	Full
		Important characterizing	*Nemertesia ramosa*	Full
Neocrania anomala and *Protanthea simplex* on very sheltered circalittoral rock	SCR.NeoPro	Important characterizing	*Ciona intestinalis*	Full
		Important characterizing	*Neocrania anomala*	Full
		Important characterizing	*Protanthea simplex*	Full
Suberites spp. and other sponges with solitary ascidians on very sheltered circalittoral rock	SCR.SubSoAs	Key structuring	*Suberites carnosus*	Basic
		Important characterizing	*Ciona intestinalis*	Full
		Important characterizing	*Clavelina lepadiformis*	Full
		Important characterizing	*Nemertesia antennina*	Basic

Biotope name	Code	Community Importance	Species	Species review type
Ascophyllum nodosum with epiphytic sponges and ascidians on variable salinity infralittoral rock	SIR.AscSAs	Key structuring	*Ascophyllum nodosum*	Full
		Important structural	*Fucus serratus*	Full
		Important characterizing	*Ciona intestinalis*	Full
		Important characterizing	*Halichondria panicea*	Full
Cordylophora caspia and *Electra crustulenta* on reduced salinity infralittoral rock	SIR.CorEle	Important characterizing	*Cordylophora caspia*	Full
		Important characterizing	*Electra crustulenta*	Basic
		Important structural	*Balanus crenatus*	Full
Mixed fucoids, *Chorda filum* and green seaweeds on reduced salinity infralittoral rock	SIR.FchoG	Important characterizing	*Chorda filum*	Full
		Important characterizing	*Fucus serratus*	Full
		Important characterizing	*Fucus vesiculosus*	Full
Hartlaubella gelatinosa and *Conopeum reticulum* on low salinity infralittoral mixed substrata	SIR.HarCon	Key structuring	*Balanus crenatus*	Full
		Key structuring	*Hartlaubella gelatinosa*	Basic
		Important characterizing	*Conopeum reticulum*	Full
Laminaria saccharina park on very sheltered lower infralittoral rock	SIR.Lsac.Pk	Key structuring	*Echinus esculentus*	Full
		Important characterizing	*Ciona intestinalis*	Full
		Important characterizing	*Laminaria saccharina*	Full
		Important characterizing	*Lithophyllum incrustans*	Full
		Important characterizing	*Ophiothrix fragilis*	Full
Laminaria saccharina, foliose red seaweeds, sponges and ascidians on tide-swept infralittoral rock	SIR.Lsac.T	Key structuring	*Laminaria saccharina*	Full
		Important characterizing	*Delesseria sanguinea*	Full
		Important functional	*Halichondria panicea*	Full
		Important other	*Botryllus schlosseri*	Full
Laminaria saccharina on reduced or low salinity infralittoral rock	SIR.LsacRS	Key structuring	*Asterias rubens*	Full
		Key structuring	*Balanus crenatus*	Full
		Key structuring	*Laminaria saccharina*	Full
		Key functional	*Psammechinus miliaris*	Full
		Important structural	*Ascidiella scabra*	Full
		Important other	*Ceramium nodulosum*	Full
		Important other	*Clavelina lepadiformis*	Full
		Important other	*Halichondria panicea*	Full
		Important other	*Mytilus edulis*	Full
		Important other	*Pomatoceros triqueter*	Full
		Important other	*Ulva lactuca*	Basic

Biotope name	Code	Community Importance	Species	Species review type
Mytilus edulis beds on reduced salinity tide-swept infralittoral rock	SIR.MytT	Key structuring	*Asterias rubens*	Full
		Key structuring	*Mytilus edulis*	Full
		Important functional	*Balanus crenatus*	Full
		Important other	*Halichondria panicea*	Full
Polyides rotundus and/or *Furcellaria lumbricalis* on reduced salinity infralittoral rock	SIR.PolFur	Important characterizing	*Furcellaria lumbricalis*	Full
		Important characterizing	*Polyides rotundus*	Basic
		Important other	*Clavelina lepadiformis*	Full
		Important other	*Ciona intestinalis*	Full
Ascophyllum nodosum on very sheltered mid eulittoral rock	SLR.Asc	Key structuring	*Ascophyllum nodosum*	Full
		Key functional	*Patella vulgata*	Full
		Important functional	*Hyale prevostii*	Full
		Important functional	*Semibalanus balanoides*	Full
Ascophyllum nodosum ecad *mackaii* beds on extremely sheltered mid eulittoral mixed substrata	SLR.AscX.mac	Key structuring	*Ascophyllum nodosum*	Full
		Important characterizing	*Hyale prevostii*	Full
		Important characterizing	*Littorina littorea*	Full
Barnacles and *Littorina littorea* on unstable eulittoral mixed substrata	SLR.BLlit	Important characterizing	*Littorina littorea*	Full
		Important characterizing	*Semibalanus balanoides*	Full
Fucus ceranoides on reduced salinity eulittoral rock	SLR.Fcer	Key structuring	*Fucus ceranoides*	Full
		Key functional	*Littorina littorea*	Full
		Important characterizing	*Enteromorpha intestinalis*	Full
		Important other	*Semibalanus balanoides*	Full
Fucus vesiculosus on mid eulittoral mixed substrata	SLR.FvesX	Important characterizing	*Fucus vesiculosus*	Full
		Important other	*Littorina littorea*	Full
		Important other	*Semibalanus balanoides*	Full
		Important other	*Patella vulgata*	Full

Appendix 5a Key Information reviews completed. Priority 1 species, designated or listed under statute or convention.

Common Name	Scientific name	Priority	UK BAP	W&C Act	Hab. Dir.	NI Act	CITES	Berne	Nat. status	Red list (IUCN)	Completion
Tentacled lagoon worm	*Alkmaria romijni*	1,4		*					Scarce	None	Refereed
Sea fan anemone	*Amphianthus dohrnii*	1,6	*						Rare	None	Complete
Lagoon sandworm	*Armandia cirrhosa*	1,4	*	*					Rare	None	Refereed
Knotted wrack	*Ascophyllum nodosum* (*)	1,2	*	*					Widespread	None	Refereed
Fan Mussel	*Atrina fragilis*	1,6	*	*		*			Scarce	None	Refereed
DeFolin's lagoon snail	*Caecum armoricum*	1,4	*	*					Rare	Insufficiently known	Refereed
A hydroid	*Clavopsella navis*	1,4	*	*					Rare	None	Refereed
Edible sea urchin	*Echinus esculentus*	1,2				*			Widespread	Lower Risk (LR/nt)	Refereed
Ivell's sea anemone	*Edwardsia ivelli*	1,4	*	*					Rare	Data deficient	Complete
Pink sea fan	*Eunicella verrucosa*	1,6	*	*					Uncommon	Vulnerable (VU A1d)	Complete
The tall sea pen	*Funiculina quadrangularis*	1	*						Not available	None	Complete
Lagoon sand shrimp	*Gammarus insensibilis*	1,4	*	*					Scarce	None	Refereed
Giant goby	*Gobius cobitis*	1,4		*					Rare	None	Complete
Couch's goby	*Gobius couchi*	1,4		*					Rare	None	Complete
Sunset cup coral	*Leptopsammia pruvoti*	1,4,6	*						Rare	None	Complete
Maerl	*Lithothamnion corallioides*	1,2	*		*				Not available	None	Refereed
Maerl	*Lithothamnion glaciale*	1,2	*						Not available	None	Complete
Horse mussel	*Modiolus modiolus*	1,2,6	*						Not available	None	Basic
Starlet sea anemone	*Nematostella vectensis*	1,4	*	*					Scarce	Vulnerable (VU A1ce)	Complete

Legend: (*) = includes *Ascophyllum nodosum* ecad *mackaii*
UK BAP = UK Biodiversity Action Plan; W&C Act = Wildlife & Conservation Act (1981); Hab. Dir. = EC Habitat Directive; NI Act = Wildlife (NI) Order 1985; CITES = CITES Convention; Berne = Berne Convention; Nat. Status = National Status; Completion = status of the Key Information review.

Prioritization criteria: 1 = Statute, Habitats Directive Annex, Red list; UK BAP; 2 = Key, Representative/ Important characterizing; 3 = Exploited; 4 = Nationally rare or scarce; 5 = Non-native; 6 = Climate change; R = Research; E = Education.

Appendix 5a Key Information reviews completed. Priority 1 species, designated or listed under statute or convention (continued).

Common Name	Scientific name	Priority	UK BAP	W&C Act	Hab. Dir.	NI Act	CITES	Berne	Nat. status	Red list (IUCN)	Completion
Dogwhelk	*Nucella lapillus*	1,2	*						Not available	None	Complete
Native oyster	*Ostrea edulis*	1,2	*						Not available	None	Complete
European spiny lobster	*Palinurus elephas*	1,3,6	*						Not available	None	Complete
Lagoon snail	*Paludinella litorina*	1,4	*	*					Rare	None	Refereed
Common piddock	*Pholas dactylus*	1						*	Not available	None	Refereed
Maerl	*Phymatolithon calcareum*	1,2,6	*		*				Not available	None	Refereed
Common goby	*Pomatoschistus microps*	1						*	Widespread	None	Complete
Sand goby	*Pomatoschistus minutus*	1						*	Widespread	None	Complete
Honeycomb worm	*Sabellaria alveolata*	1,2	*						Not available	None	Refereed
Ross worm	*Sabellaria spinulosa*	1,2	*						Not available	None	Refereed
Serpulid tube worm	*Serpula vermicularis*	1,2	*						Not available	None	Complete
Lagoon sea slug	*Tenellia adspersa*	1,4	*	*					Rare	None	Refereed
Northern hatchet shell	*Thyasira gouldi*	1,4	*	*					Rare	None	Complete
Looping snail	*Truncatella subcylindrica*	1,4	*						Rare	Rare	Refereed
Common eelgrass	*Zostera marina*	1	*					*	Not available	None	Refereed
Dwarf eelgrass	*Zostera noltii*	1,4	*						Scarce	None	Complete

Legend:
UK BAP = UK Biodiversity Action Plan; W&C Act = Wildlife & Conservation Act (1981); Hab. Dir. = EC Habitat Directive; NI Act = Wildlife (NI) Order 1985; CITES = CITES Convention; Berne = Berne Convention; Nat. Status = National Status; Completion = status of the Key Information review.

Prioritization criteria: 1 = Statute, Habitats Directive Annex, Red list; UK BAP; 2 = Key, Representative/ Important characterizing; 3 = Exploited; 4 = Nationally rare or scarce; 5 = Non-native; 6 = Climate change; R = Research; E = Education.

Appendix 5b Key Information reviews completed. Priority 2 species; key, characterizing or exemplary species.

Common Name	Scientific name	Priority	UK BAP	W&C Act	Hab. Dir.	NI Act	CITES	Berne	Nat. status	Red list (IUCN)	Completion
A bivalve	*Abra alba*	2							Widespread	None	Complete
A red seaweed	*Ahnfeltia plicata*	2							Widespread	None	Complete
Dabberlocks	*Alaria esculenta*	2							Not available	None	Refereed
Dead man's fingers	*Alcyonium digitatum*	2							Widespread	None	Refereed
A brittlestar	*Amphiura chiajei*	2							Not available	None	Complete
A brittlestar	*Amphiura filiformis*	2							Not available	None	Complete
Rosy featherstar	*Antedon bifida*	2							Not available	None	Complete
A polychaete	*Aphelochaeta marioni*	2							Not available	None	Refereed
Blow lug	*Arenicola marina*	2							Widespread	None	Refereed
A sea squirt	*Ascidiella scabra*	2							Widespread	None	Complete
Common starfish	*Asterias rubens*	2							Widespread	None	Refereed
An acorn barnacle	*Balanus crenatus*	2							Widespread	None	Refereed
An amphipod	*Bathyporeia pelagica*	2							Not available	None	Complete
Star ascidian	*Botryllus schlosseri*	2							Widespread	None	Complete
A heart urchin	*Brissopsis lyrifera*	2							Not available	None	Complete
A bryozoan	*Bugula turbinata*	2							Not available	None	Complete
A burrowing mud shrimp	*Callianassa subterranea*	2							Not available	None	Complete
A polychaete	*Capitella capitata*	2							Widespread	None	Complete
A red seaweed	*Ceramium nodulosum*	2							Widespread	None	Complete

Legend:
UK BAP = UK Biodiversity Action Plan; W&C Act = Wildlife & Conservation Act (1981); Hab. Dir. = EC Habitat Directive; NI Act = Wildlife (NI) Order 1985; CITES = CITES Convention; Berne = Berne Convention; Nat. Status = National Status; Completion = status of the Key Information review.

Prioritization criteria: 1 = Statute, Habitats Directive Annex, Red list; UK BAP; 2 = Key, Representative/ Important characterizing; 3 = Exploited; 4 = Nationally rare or scarce; 5 = Non-native; 6 = Climate change; R = Research; E = Education.

Appendix 5b Key Information reviews completed. Priority 2 species; key, characterizing or exemplary species (continued).

Common Name	Scientific name	Priority	UK BAP	W&C Act	Hab. Dir.	NI Act	CITES	Berne	Nat. status	Red list (IUCN)	Completion
Common cockle	*Cerastoderma edule*	2,3							Widespread	None	Complete
Lagoon cockle	*Cerastoderma glaucum*	2							Not available	None	Refereed
Carrageen	*Chondrus crispus*	2							Widespread	None	Complete
Sea lace or Dead man's rope	*Chorda filum*	2							Not available	None	Complete
Montagu's stellate barnacle	*Chthamalus montagui*	2							Widespread	None	Complete
Poli's stellate barnacle	*Chthamalus stellatus*	2							Widespread	None	Complete
A sea squirt	*Ciona intestinalis*	2							Not available	None	Refereed
A green seaweed	*Cladophora rupestris*	2							Not available	None	Complete
Light bulb sea squirt	*Clavelina lepadiformis*	2							Widespread	None	Complete
A bryozoan	*Conopeum reticulum*	2							Not available	None	Complete and
Coral weed	*Corallina officinalis*	2							Widespread	None	Refereed
A hydroid	*Cordylophora caspia*	2							Not available	None	Complete and
Slipper limpet	*Crepidula fornicata*	2,5							Not available	None	Refereed
Sea beech	*Delesseria sanguinea*	2							Widespread	None	Complete
Sea potato	*Echinocardium cordatum*	2							Not available	None	Refereed
A sea mat	*Electra pilosa*	2							Not available	None	Complete
Razor shell	*Ensis* spp.	2							Not available	None	Complete
Gut weed	*Enteromorpha intestinalis*	2							Common	None	Complete and
An isopod	*Eurydice pulchra*	2							Not available	None	Complete and

Legend:
UK BAP = UK Biodiversity Action Plan; W&C Act = Wildlife & Conservation Act (1981); Hab. Dir. = EC Habitat Directive; NI Act = Wildlife (NI) Order 1985; CITES = CITES Convention; Berne = Berne Convention; Nat. Status = National Status; Completion = status of the Key Information review.

Prioritization criteria: 1 = Statute, Habitats Directive Annex, Red list; UK BAP; 2 = Key, Representative/ Important characterizing; 3 = Exploited; 4 = Nationally rare or scarce; 5 = Non-native; 6 = Climate change; R = Research; E = Education.

Appendix 5b Key Information reviews completed. Priority 2 species; key, characterizing or exemplary species (continued).

Common Name	Scientific name	Priority	UK BAP	W&C Act	Hab. Dir.	NI Act	CITES	Berne	Nat. status	Red list (IUCN)	Completion
A bivalve	*Fabulina fabula*	2							Widespread	None	Complete and
Hornwrack	*Flustra foliacea*	2							Not available	None	Complete and
Horned wrack	*Fucus ceranoides*	2							Not available	None	Refereed
A brown seaweed	*Fucus distichus*	2							Not available	None	Refereed
Toothed wrack	*Fucus serratus*	2							Not available	None	Refereed
Spiral wrack	*Fucus spiralis*	2							Not available	None	Refereed
Bladder wrack	*Fucus vesiculosus*	2							Widespread	None	Complete
A red seaweed	*Furcellaria lumbricalis*	2							Not available	None	Complete and
A gammarid shrimp	*Gammarus salinus*	2							Not available	None	Complete and
Bowerbank's halichondria	*Halichondria bowerbanki*	2							Not available	None	Complete and
Breadcrumb sponge	*Halichondria panicea*	2							Not available	None	Complete
Sea oak	*Halidrys siliquosa*	2							Not available	None	Complete
Ragworm	*Hediste diversicolor*	2							Widespread	None	Complete
Blue – rayed limpet	*Helcion pellucidum*	2							Not available	None	Refereed
Thongweed	*Himanthalia elongata*	2							Not available	None	Refereed
An amphipod	*Hyale prevostii*	2							Not available	None	Refereed
Laver spire shell	*Hydrobia ulvae*	2							Not available	None	Refereed
An amphipod	*Jassa falcata*	2							Not available	None	Refereed
Banded chink shell	*Lacuna vincta*	2							Not available	None	Refereed

Legend:
UK BAP = UK Biodiversity Action Plan; W&C Act = Wildlife & Conservation Act (1981); Hab. Dir. = EC Habitat Directive; NI Act = Wildlife (NI) Order 1985; CITES = CITES Convention; Berne = Berne Convention; Nat. Status = National Status; Completion = status of the Key Information review.

Prioritization criteria: 1 = Statute, Habitats Directive Annex, Red list; UK BAP; 2 = Key, Representative/ Important characterizing; 3 = Exploited; 4 = Nationally rare or scarce; 5 = Non-native; 6 = Climate change; R = Research; E = Education.

Appendix 5b Key Information reviews completed. Priority 2 species; key, characterizing or exemplary species (continued).

Common Name	Scientific name	Priority	UK BAP	W&C Act	Hab. Dir.	NI Act	CITES	Berne	Nat. status	Red list (IUCN)	Completion
Oarweed	*Laminaria digitata*	2							Widespread	None	Complete
Tangle or cuvie	*Laminaria hyperborea*	2							Widespread	None	Complete
Oarweed	*Laminaria saccharina*	2							Widespread	None	Complete
Sand mason	*Lanice conchilega*	2							Not available	None	Complete and
Harbour crab	*Liocarcinus depurator*	2							Not available	None	Complete
Encrusting corallines	*Lithophyllum incrustans*	2							Widespread	None	Complete
Common periwinkle	*Littorina littorea*	2							Widespread	None	Complete
Baltic tellin	*Macoma balthica*	2							Widespread	None	Refereed and
A polychaete	*Magelona mirabilis*	2,3							Widespread	None	Refereed
Plumose anemone	*Metridium senile*	2							Widespread	None	Complete and
Sea grapes	*Molgula manhattensis*	2							Widespread	None	Complete and
A colonial tunicate	*Morchellium argus*	2							Not available	None	Complete
Sand gaper	*Mya arenaria*	2							Widespread	None	Refereed
Common mussel	*Mytilus edulis*	2,3							Widespread	None	Complete
A hydroid	*Nemertesia ramosa*	2							Not available	None	Complete
A brachiopod	*Neocrania anomala*	2							Not available	None	Complete
An opossum shrimp	*Neomysis integer*	2							Not available	None	Complete and
Gravel sea cucumber	*Neopentadactyla mixta*	2							Not available	None	Refereed
A catworm	*Nephtys hombergii*	2							Not available	None	Complete
Common brittlestar	*Ophiothrix fragilis*	2							Not available	None	Complete

Legend:
UK BAP = UK Biodiversity Action Plan; W&C Act = Wildlife & Conservation Act (1981); Hab. Dir. = EC Habitat Directive; NI Act = Wildlife (NI) Order 1985; CITES = CITES Convention; Berne = Berne Convention; Nat. Status = National Status; Completion = status of the Key Information review.

Prioritization criteria: 1 = Statute, Habitats Directive Annex, Red list; UK BAP; 2 = Key, Representative/ Important characterizing; 3 = Exploited; 4 = Nationally rare or scarce; 5 = Non-native; 6 = Climate change; R = Research; E = Education.

Appendix 5b Key Information reviews completed. Priority 2 species; key, characterizing or exemplary species (continued).

Common Name	Scientific name	Priority	UK BAP	W&C Act	Hab. Dir.	NI Act	CITES	Berne	Nat. status	Red list (IUCN)	Completion
Dulse	*Palmaria palmata*	2,3							Widespread	None	Refereed
Common limpet	*Patella vulgata*	2							Widespread	None	Refereed
Channelled wrack	*Pelvetia canaliculata*	2							Not available	None	Refereed
Ross	*Pentapora fascialis*	2							Not available	None	Refereed
A sea slug	*Philine aperta*	2							Not available	None	Complete
Long-clawed porcelain crab	*Pisidia longicornis*	2							Widespread	None	Complete
A polychaete	*Polydora ciliata*	2							Not available	None	Complete
Sea loch anemone	*Protanthea simplex*	2							Not available	None	Complete
Green sea urchin	*Psammechinus miliaris*	2							Not available	None	Complete
A red seaweed	*Rhodothamniella floridula*	2							Uncommon	None	Complete
Furbelows	*Saccorhiza polyschides*	2							Not available	None	Complete
An acorn barnacle	*Semibalanus balanoides*	2							Widespread	None	Refereed
A polychaete	*Spio filicornis*	2							Not available	None	Complete
A polychaete	*Spiophanes bombyx*	2							Not available	None	Complete
A sand hopper	*Talitrus saltator*	2							Widespread	None	Complete
An encrusting bryozoan	*Umbonula littoralis*	2							Widespread	None	Refereed
Dahlia anemone	*Urticina felina*	2							Widespread	None	Complete
Pullet carpet shell	*Venerupis senegalensis*	2							Not available	None	Complete
A sea pen	*Virgularia mirabilis*	2							Not available	None	Complete

Legend:
UK BAP = UK Biodiversity Action Plan; W&C Act = Wildlife & Conservation Act (1981); Hab. Dir. = EC Habitat Directive; NI Act = Wildlife (NI) Order 1985; CITES = CITES Convention; Berne = Berne Convention; Nat. Status = National Status; Completion = status of the Key Information review.

Prioritization criteria: 1 = Statute, Habitats Directive Annex, Red list; UK BAP; 2 = Key, Representative/ Important characterizing; 3 = Exploited; 4 = Nationally rare or scarce; 5 = Non-native; 6 = Climate change; R = Research; E = Education.

Appendix 5c Key Information reviews completed. Research only species.

Common Name	Scientific name	Priority	UK BAP	W&C Act	Hab. Dir.	NI Act	CITES	Berne	Nat. status	Red list (IUCN)	Completion
Little squid	*Alloteuthis media*	R							Not available	None	Complete
European common squid	*Alloteuthis subulata*	R							Not available	None	Complete
North Atlantic octopus	*Bathypolypus arcticus*	R							Not available	None	Complete
Curled octopus	*Eledone cirrhosa*	R							Not available	None	Complete
Bloody Henry starfish	*Henricia oculata*	R							Not available	None	Refereed
Broadtail shortfin squid	*Illex coindetii*	R							Not available	None	Complete
Long finned squid	*Loligo forbesii*	R							Not available	None	Complete
Common squid	*Loligo vulgaris*	R							Not available	None	Complete
Common octopus	*Octopus vulgaris*	R							Not available	None	Complete
Stout bobtail	*Rossia macrosoma*	R							Not available	None	Complete
Elegant cuttlefish	*Sepia elegans*	R							Not available	None	Complete
Common cuttlefish	*Sepia officinalis*	R							Not available	None	Complete
Pink cuttlefish	*Sepia orbigniana*	R							Not available	None	Complete
Common bobtail	*Sepietta oweniana*	R							Not available	None	Complete
Little cuttlefish	*Sepiola atlantica*	R							Not available	None	Complete
Dwarf bobtail	*Sepiola rondeletii*	R							Not available	None	Complete
Lesser flying squid	*Todaropsis eblanae*	R							Not available	None	Complete

Legend:
UK BAP = UK Biodiversity Action Plan; W&C Act = Wildlife & Conservation Act (1981); Hab. Dir. = EC Habitat Directive; NI Act = Wildlife (NI) Order 1985; CITES = CITES Convention; Berne = Berne Convention; Nat. Status = National Status; Completion = status of the Key Information review.

Prioritization criteria: 1 = Statute, Habitats Directive Annex, Red list; UK BAP; 2 = Key, Representative/ Important characterizing; 3 = Exploited; 4 = Nationally rare or scarce; 5 = Non-native; 6 = Climate change; R = Research; E = Education.

Appendix 5d Basic information researched. Priority 1 species, designated or listed under statute or convention.

Common Name	Scientific name	Priority	UK BAP	W&C Act	Hab. Dir.	NI Act	CITES	Berne	Nat. status	Red list (IUCN)	Completion
Trumpet anemone	*Aiptasia mutabilis*	1,4	*						Scarce	None	Basic
Red sea fingers	*Alcyonium glomeratum*	1,6	*						Not available	None	Basic
A red seaweed	*Anotrichium barbatum*	1,4	*						Rare	None	Basic
Scarlet and gold star coral	*Balanophyllia regia*	1,6	*				*	*	Scarce	None	Basic
Devonshire cup-coral	*Caryophyllia smithii*	1,2,4	*				*		Not available	None	Basic
Basking shark	*Cetorhinus maximus*	1	*	*			*		Not available	Vulnerable	Basic
Leatherback turtle	*Dermochelys coriacia*	1	*	*	*		*	*	Not available	Critically Endangered	Basic
Skate	*Dipturus batis*	1	*						Not available	Endangered	Basic
Carpet coral	*Hoplangia durotrix*	1,4					*		Rare	None	Basic
Foxtail stonewort	*Lamprothamnium papulosum*	1,2,4		*					Scarce	Vulnerable	Basic
A cold water coral	*Lophelia pertusa*	1,2	*		*		*		Not available	None	Basic
Killer whale	*Orcinus orca*	1	*	*	*	*		*	Not available	Lower risk (LR/cd)	Basic
Fireworks anemone	*Pachycerianthus multiplicatus*	1,4	*						Scarce	None	Basic
Purple sea urchin	*Paracentrotus lividus*	1,3,4,6	*						Scarce	None	Basic
Cluster anemone	*Parazoanthus anguicomus*	1	*						Not available	None	Basic
Yellow cluster anemone	*Parazoanthus axinellae*	1,4	*						Scarce	None	Basic
Harbour porpoise	*Phocoena phocoena*	1	*	*	*	*	*	*	Not available	Insufficiently known	Basic
Common reed	*Phragmites australis*	1,2	*						Widespread	None	Basic

Legend:
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Prioritization criteria: 1 = Statute, Habitats Directive Annex, Red list; UK BAP; 2 = Key, Representative/ Important characterizing; 3 = Exploited; 4 = Nationally rare or scarce; 5 = Non-native; 6 = Climate change; R = Research; E = Education.

Appendix 5d Basic information researched. Priority 1 species, designated or listed under statute or convention (continued).

Common Name	Scientific name	Priority	UK BAP	W&C Act	Hab. Dir.	NI Act	CITES	Berne	Nat. status	Red list (IUCN)	Completion
Worm anemone	*Scolanthus callimorphus*	1,4	*						Rare	None	Basic
Northern sea urchin	*Strongylocentrotus droebachiensis*	1,4,6	*						Rare	None	Basic
A sea-squirt	*Styela gelatinosa*	1	*						Not available	None	Basic
Bottlenose dolphin	*Tursiops truncatus*	1	*	*	*	*	*		Not available	Data deficient	Basic
Trembling sea mat	*Victorella pavida*	1,4	*	*					Rare	None	Basic

Legend:
UK BAP = UK Biodiversity Action Plan; W&C Act = Wildlife & Conservation Act (1981); Hab. Dir. = EC Habitat Directive; NI Act = Wildlife (NI) Order 1985; CITES = CITES Convention; Berne = Berne Convention; Nat. Status = National Status; Completion = status of the Key Information review.

Prioritization criteria: 1 = Statute, Habitats Directive Annex, Red list; UK BAP; 2 = Key, Representative/ Important characterizing; 3 = Exploited; 4 = Nationally rare or scarce; 5 = Non-native; 6 = Climate change; R = Research; E = Education.

Appendix 5e Basic information researched. Priority 2 species; key, characterizing or exemplary species.

Common Name	Scientific name	Priority	UK BAP	W&C Act	Hab. Dir.	NI Act	CITES	Berne	Nat. status	Red list (IUCN)	Completion
Beadlet anemone	*Actinia equina*	2							Widespread	None	Basic
A bryozoan	*Alcyonidium diaphanum*	2							Not available	None	Basic
An amphipod	*Ampelisca brevicornis*	2							Not available	None	Basic
Wolffish or Catfish	*Anarhichas lupus*	2,6							Not available	None	Basic
Snakelocks anemone	*Anemonia viridis*	2							Widespread	None	Basic
Icelandic cyprine	*Arctica islandia*	2							Not available	None	Basic
A sea squirt	*Ascidiella aspersa*	2							Not available	None	Basic
A bivalve	*Astarte sulcata*	2							Not available	None	Basic
A cushion star	*Asterina gibbosa*	2							Widespread	None	Basic
A branching sponge	*Axinella dissimilis*	2							Not available	None	Basic
A barnacle	*Balanus perforatus*	2,6							Not available	None	Basic
White Piddock	*Barnea candida*	2							Not available	None	Basic
A brown seaweed	*Bifurcaria bifurcata*	2,6							Not available	None	Basic
A green seaweed	*Blidingia minima*	2							Not available	None	Basic
A colonial sea squirt	*Botrylloides leachi*	2							Not available	None	Basic
Common whelk	*Buccinum undatum*	2							Widespread	None	Basic
A bryozoan	*Bugula flabellata*	2							Not available	None	Basic
Painted top shell	*Calliostoma zizyphinum*	2							Not available	None	Basic
A lichen	*Caloplaca marina*	2							Not available	None	Basic

Legend:
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Prioritization criteria: 1 = Statute, Habitats Directive Annex, Red list; UK BAP; 2 = Key, Representative/ Important characterizing; 3 = Exploited; 4 = Nationally rare or scarce; 5 = Non-native; 6 = Climate change; R = Research; E = Education.

Appendix 5e Basic information researched. Priority 2 species; key, characterizing or exemplary species (continued).

Common Name	Scientific name	Priority	UK BAP	W&C Act	Hab. Dir.	NI Act	CITES	Berne	Nat. status	Red list (IUCN)	Completion
Edible crab	*Cancer pagurus*	2							Not available	None	Basic
Common shore crab	*Carcinus maenas*	2							Not available	None	Basic
Daisy Anemone	*Cereus pedunculatus*	2							Not available	None	Basic
A tube anemone	*Cerianthus lloydii*	2							Not available	None	Basic
A tube worm	*Chaetopterus variopedatus*	2							Not available	None	Basic
A polychaete	*Cirratulus cirratus*	2							Not available	None	Basic
Club-headed hydroid	*Clava multicornis*	2							Not available	None	Basic
Velvet horn	*Codium tomentosum*	2							Not available	None	Basic
Basket shell	*Corbula gibba*	2							Not available	None	Basic
An amphipod	*Corophium volutator*	2							Not available	None	Basic
Jewel anemone	*Corynactis viridis*	2,6							Not available	None	Basic
Masked crab	*Corystes cassivelaunus*	2							Not available	None	Basic
Common sun star	*Crossaster papposus*	2							Not available	None	Basic
A red seaweed	*Cryptopleura ramosa*	2							Not available	None	Basic
Baked bean ascidian	*Dendrodoa grossularia*	2							Not available	None	Basic
A brown seaweed	*Dictyopteris membranacea*	2,6							Not available	None	Basic
Lesser gooseberry sea squirt	*Distomus variolosus*	2							Not available	None	Basic
A red seaweed	*Drachiella spectabilis*	2							Not available	None	Basic
A sea mat	*Electra crustulenta*	2							Not available	None	Basic
A polychaete	*Eteone longa*	2							Not available	None	Basic
A bryozoan	*Eucratea loricata*	2							Not available	None	Basic
Green-leaf worm	*Eulalia viridis*	2							Not available	None	Basic

Legend:
UK BAP = UK Biodiversity Action Plan; W&C Act = Wildlife & Conservation Act (1981); Hab. Dir. = EC Habitat Directive; NI Act = Wildlife (NI) Order 1985; CITES = CITES Convention; Berne = Berne Convention; Nat. Status = National Status; Completion = status of the Key Information review.

Prioritization criteria: 1 = Statute, Habitats Directive Annex, Red list; UK BAP; 2 = Key, Representative/ Important characterizing; 3 = Exploited; 4 = Nationally rare or scarce; 5 = Non-native; 6 = Climate change; R = Research; E = Education.

Appendix 5e Basic information researched. Priority 2 species; key, characterizing or exemplary species (continued).

Common Name	Scientific name	Priority	UK BAP	W&C Act	Hab. Dir.	NI Act	CITES	Berne	Nat. status	Red list (IUCN)	Completion
Grey top shell	*Gibbula cineraria*	2							Not available	None	Basic
Flat top shell	*Gibbula umbilicalis*	2							Not available	None	Basic
Angular crab	*Goneplax rhomboides*	2							Not available	None	Basic
A hydroid	*Hartlaubella gelatinosa*	2,4							Rare	None	Basic
Great spider crab	*Hyas araneus*	2							Not available	None	Basic
A hydroid	*Kirchenpaueria pinnata*	2							Not available	None	Basic
A sea cucumber	*Labidoplax media*	2							Not available	None	Basic
A polychaete	*Lagis koreni*	2							Not available	None	Basic
A lichen	*Lichina pygmaea*	2							Not available	None	Basic
Common sea slater	*Ligia oceanica*	2							Not available	None	Basic
Gaping file shell	*Limaria hians*	2							Not available	None	Basic
Rough periwinkle	*Littorina saxatilis*	2							Not available	None	Basic
A red seaweed	*Lomentaria articulata*	2							Not available	None	Basic
A starfish	*Luidia ciliaris*	2							Not available	None	Basic
A fanworm	*Manayunkia aestuarina*	2							Not available	None	Basic
Spiny starfish	*Marthasterias glacialis*	2							Not available	None	Basic
A red seaweed	*Mastocarpus stellatus*	2							Not available	None	Basic
Small periwinkle	*Melaharphe neritoides*	2							Not available	None	Basic
Rugose squat lobster	*Munida rugosa*	2,3							Not available	None	Basic
Green crenella	*Musculus discors*	2							Widespread	None	Basic
Blunt gaper	*Mya truncata*	2							Not available	None	Basic
A fanworm	*Myxicola infundibulum*	2							Not available	None	Basic

Legend:
UK BAP = UK Biodiversity Action Plan; W&C Act = Wildlife & Conservation Act (1981); Hab. Dir. = EC Habitat Directive; NI Act = Wildlife (NI) Order 1985; CITES = CITES Convention; Berne = Berne Convention; Nat. Status = National Status; Completion = status of the Key Information review.

Prioritization criteria: 1 = Statute, Habitats Directive Annex, Red list; UK BAP; 2 = Key; Representative/ Characterizing; 3 = Exploited; 4 = Nationally rare or scarce; 5 = Non-native; 6 = Climate change; R = Research; E = Education

Appendix 5e Basic information researched. Priority 2 species; key, characterizing or exemplary species (continued).

Common Name	Scientific name	Priority	UK BAP	W&C Act	Hab. Dir.	NI Act	CITES	Berne	Nat. status	Red list (IUCN)	Completion
Velvet fiddler crab	*Necora puber*	2,3							Not available	None	Basic
Sea beard	*Nemertesia antennina*	2							Not available	None	Basic
Norway lobster	*Nephrops norvegicus*	2,3							Not available	None	Basic
A catworm	*Nephtys incisa*	2							Not available	None	Basic
A polychaete	*Notomastus latericeus*	2							Not available	None	Basic
A bivalve	*Nucula nitidosa*	2							Not available	None	Basic
A lichen	*Ochrolechia parella*	2							Not available	None	Basic
A sea cucumber	*Ocnus planci*	2							Not available	None	Basic
Black brittlestar	*Ophiocomina nigra*	2							Not available	None	Basic
A brittlestar	*Ophiura albida*	2							Not available	None	Basic
Thick top shell	*Osilinus lineatus*	2							Not available	None	Basic
Pepper dulse	*Osmundea pinnatifida*	2							Not available	None	Basic
A tube worm	*Owenia fusiformis*	2							Not available	None	Basic
A cockle	*Parvicardium ovale*	2							Not available	None	Basic
China limpet	*Patella ulyssiponensis*	2							Not available	None	Basic
Sea gherkin	*Pawsonia saxicola*	2							Not available	None	Basic
Great scallop	*Pecten maximus*	2,3							Not available	None	Basic
An amphipod	*Pectenogammarus planicrurus*	2,4							Scarce	None	Basic
Phosphorescent sea pen	*Pennatula phosphorea*	2							Not available	None	Basic
American piddock	*Petricola pholadiformis*	2							Not available	None	Basic
Sea bristletail	*Petrobius maritimus*	2							Not available	None	Basic

Legend:
UK BAP = UK Biodiversity Action Plan; W&C Act = Wildlife & Conservation Act (1981); Hab. Dir. = EC Habitat Directive; NI Act = Wildlife (NI) Order 1985; CITES = CITES Convention; Berne = Berne Convention; Nat. Status = National Status; Completion = status of the Key Information review.

Prioritization criteria: 1 = Statute, Habitats Directive Annex, Red list; UK BAP; 2 = Key, Representative/ Important characterizing; 3 = Exploited; 4 = Nationally rare or scarce; 5 = Non-native; 6 = Climate change; R = Research; E = Education.

Appendix 5e Basic information researched. Priority 2 species; key, characterizing or exemplary species (continued).

Common Name	Scientific name	Priority	UK BAP	W&C Act	Hab. Dir.	NI Act	CITES	Berne	Nat. status	Red list (IUCN)	Completion
A red seaweed	*Phycodrys rubens*	2							Not available	None	Basic
Flounder	*Platichthys flesus*	2							Not available	None	Basic
A red seaweed	*Polyides rotundus*	2							Not available	None	Basic
Fennel pondweed	*Potamogeton pectinatus*	2							Not available	None	Basic
Common saltmarsh grass	*Puccinellia maritima*	2							Not available	None	Basic
A polychaete	*Pygospio elegans*	2							Not available	None	Basic
Sea ivory	*Ramalina siliquosa*	2							Not available	None	Basic
Beaked tasselweed	*Ruppia maritima*	2							Not available	None	Basic
Peacock worm	*Sabella pavonina*	2							Not available	None	Basic
Wireweed	*Sargassum muticum*	2,5							Not available	None	Basic
Peppery furrow shell	*Scrobicularia plana*	2							Not available	None	Basic
A serpulid tubeworm	*Spirorbis spirorbis*	2							Not available	None	Basic
A bivalve	*Spisula elliptica*	2							Not available	None	Basic
A sponge	*Suberites carnosus*	2							Not available	None	Basic
A sponge	*Suberites ficus*	2							Not available	None	Basic
A sponge	*Suberites massa*	2							Not available	None	Basic
Northern sea fan	*Swiftia pallida*	2,6							Not available	None	Basic

Legend:
UK BAP = UK Biodiversity Action Plan; W&C Act = Wildlife & Conservation Act (1981); Hab. Dir. = EC Habitat Directive; NI Act = Wildlife (NI) Order 1985; CITES = CITES Convention; Berne = Berne Convention; Nat. Status = National Status; Completion = status of the Key Information review.

Prioritization criteria: 1 = Statute, Habitats Directive Annex, Red list; UK BAP; 2 = Key, Representative/ Important characterizing; 3 = Exploited; 4 = Nationally rare or scarce; 5 = Non-native; 6 = Climate change; R = Research; E = Education.

Appendix 5e Basic information researched**.** Priority 2 species; key, characterizing or exemplary species (continued).

Common Name	Scientific name	Priority	UK BAP	W&C Act	Hab. Dir.	NI Act	CITES	Berne	Nat. status	Red list (IUCN)	Completion
Common tortoiseshell limpet	*Tectura testudinalis*	2,6							Not available	None	Basic
A bivalve	*Tellimya ferruginosa*	2							Not available	None	Basic
Black shields	*Tephromela atra*	2							Widespread	None	Basic
Sea lettuce	*Ulva lactuca*	2							Not available	None	Basic
A lichen	*Verrucaria maura*	2							Not available	None	Basic
A lichen	*Verrucaria mucosa*	2							Not available	None	Basic
A lichen	*Xanthoria parietina*	2							Widespread	None	Basic

Legend:
UK BAP = UK Biodiversity Action Plan; W&C Act = Wildlife & Conservation Act (1981); Hab. Dir. = EC Habitat Directive; NI Act = Wildlife (NI) Order 1985; CITES = CITES Convention; Berne = Berne Convention; Nat. Status = National Status; Completion = status of the Key Information review.

Prioritization criteria: 1 = Statute, Habitats Directive Annex, Red list; UK BAP; 2 = Key, Representative/ Important characterizing; 3 = Exploited; 4 = Nationally rare or scarce; 5 = Non-native; 6 = Climate change; R = Research; E = Education.

Appendix 5f Basic information researched. Nationally rare or scarce species.

Common Name	Scientific name	Priority	UK BAP	W&C Act	Hab. Dir.	NI Act	CITES	Berne	Nat. status	Red list (IUCN)	Completion
Cranch's spider crab	*Achaeus cranchii*	4							Scarce	None	Basic
A sea slug	*Aeolidiella sanguinea*	4							Rare	None	Basic
A hydroid	*Aglaophenia kirchenpaueri*	4							Scarce	None	Basic
A sea slug	*Aeolidiella sanguinea*	4							Rare	None	Basic
Pink sea fingers	*Alcyonium hibernicum*	4							Scarce	None	Basic
A spoon worm	*Amalosoma eddystonense*	4							Scarce	None	Basic
A sea anemone	*Anemonactis mazeli*	4							Scarce	None	Basic
A sea anemone	*Arachnanthus sarsi*	4							Rare	None	Basic
A sea slug	*Atagema gibba*	4							Rare	None	Basic
A sea slug	*Caloria elegans*	4							Scarce	None	Basic
Southern cup coral	*Caryophyllia inornata*	4					*		Rare	None	Basic
Latticed corklet	*Cataphellia brodricii*	4							Scarce	None	Basic
A hermit crab	*Clibanarius erythropus*	4							Rare	None	Basic
An amphipod	*Corophium lacustre*	4							Scarce	None	Basic
A sea slug	*Doris sticta*	4							Scarce	None	Basic
Sponge crab	*Dromia personata*	4							Scarce	None	Basic
A sea anemone	*Edwardsia timida*	4							Scarce	None	Basic
A barnacle	*Elminius modestus*	4							Not available	None	Basic
A sea anemone	*Halcampoides elongatus*	4							Rare	None	Basic
A sea slug	*Hero formosa*	4							Scarce	None	Basic

Legend:
UK BAP = UK Biodiversity Action Plan; W&C Act = Wildlife & Conservation Act (1981); Hab. Dir. = EC Habitat Directive; NI Act = Wildlife (NI) Order 1985; CITES = CITES Convention; Berne = Berne Convention; Nat. Status = National Status; Completion = status of the Key Information review.

Prioritization criteria: 1 = Statute, Habitats Directive Annex, Red list; UK BAP; 2 = Key, Representative/ Important characterizing; 3 = Exploited; 4 = Nationally rare or scarce; 5 = Non-native; 6 = Climate change; R = Research; E = Education.

Appendix 5f Basic information researched. Nationally rare or scarce species (continued).

Common Name	Scientific name	Priority	UK BAP	W&C Act	Hab. Dir.	NI Act	CITES	Berne	Nat. status	Red list (IUCN)	Completion
A hydroid	*Laomedea angulata*	4							Scarce	None	Basic
A sea anemone	*Mesacmaea mitchellii*	4							Scarce	None	Basic
A hydroid	*Obelia bidentata*	4							Rare	None	Basic
Yellow skirt slug	*Okenia elegans*	4							Scarce	None	Basic
A sea slug	*Stiliger bellulus*	4							Rare	None	Basic
A hydroid	*Tamarisca tamarisca*	4							Scarce	None	Basic
A sea slug	*Trapania maculata*	4							Rare	None	Basic
A sea slug	*Trapania pallida*	4							Scarce	None	Basic
A sea slug	*Tritonia nilsodhneri*	4							Scarce	None	Basic
A bryozoan	*Turbicellepora magnicostata*	4							Rare	None	Basic
Penny weed	*Zanardinia prototypus*	4							Scarce	None	Basic
A sponge	*Adreus fascicularis*	4,6							Rare	None	Basic
Glaucus pimplet	*Anthopleura thallia*	4,6							Scarce	None	Basic
A sea cucumber	*Cucumaria frondosa*	4,6							Scarce	None	Basic
Blue spot slug	*Greilada elegans*	4,6							Rare	None	Basic
Peacocks tail	*Padina pavonica*	4,6							Scarce	None	Basic

Legend:
UK BAP = UK Biodiversity Action Plan; W&C Act = Wildlife & Conservation Act (1981); Hab. Dir. = EC Habitat Directive; NI Act = Wildlife (NI) Order 1985; CITES = CITES Convention; Berne = Berne Convention; Nat. Status = National Status; Completion = status of the Key Information review.

Prioritization criteria: 1 = Statute, Habitats Directive Annex, Red list; UK BAP; 2 = Key, Representative/ Important characterizing; 3 = Exploited; 4 = Nationally rare or scarce; 5 = Non-native; 6 = Climate change; R = Research; E = Education.

Appendix 5g Basic information researched. Non-native species.

Common Name	Scientific name	Priority	UK BAP	W&C Act	Hab. Dir.	NI Act	CITES	Berne	Nat. status	Red list (IUCN)	Completion
Harpoon weed	*Asparagopsis armata*	5,6							Not available	None	Basic
Portuguese oyster	*Crassostrea gigas*	5							Not available	None	Basic
A sea squirt	*Perophora japonica*	5							Not available	None	Basic

Legend:
UK BAP = UK Biodiversity Action Plan; W&C Act = Wildlife & Conservation Act (1981); Hab. Dir. = EC Habitat Directive; NI Act = Wildlife (NI) Order 1985; CITES = CITES Convention; Berne = Berne Convention; Nat. Status = National Status; Completion = status of the Key Information review.

Prioritization criteria: 1 = Statute, Habitats Directive Annex, Red list; UK BAP; 2 = Key, Representative/ Important characterizing; 3 = Exploited; 4 = Nationally rare or scarce; 5 = Non-native; 6 = Climate change; R = Research; E = Education.

Appendix 5h Basic information researched. Species sensitive to climate change.

Common Name	Scientific name	Priority	UK BAP	W&C Act	Hab. Dir.	NI Act	CITES	Berne	Nat. status	Red list (IUCN)	Completion
Gem anemone	*Aulactinia verrucosa*	6							Not available	None	Basic
Trigger fish	*Balistes carolinensis*	6							Not available	None	Basic
Deeplet sea anemone	*Bolocera tuediae*	6							Not available	None	Basic
A brown seaweed	*Carpomitra costata*	6							Not available	None	Basic
A sponge	*Ciocalypta penicillus*	6							Not available	None	Basic
Lumpsucker	*Cyclopterus lumpus*	6							Not available	None	Basic
Bryer's nut crab	*Ebalia tumefacta*	6							Not available	None	Basic
Red starfish	*Echinaster sepositus*	6							Not available	None	Basic
Yellow feathers	*Gymnangium montagui*	6							Not available	None	Basic
Cotton spinner	*Holothuria forskali*	6							Not available	None	Basic
Arch-fronted swimming crab	*Liocarcinus arcuatus*	6							Not available	None	Basic
Wrinkled swimming crab	*Liocarcinus corrugatus*	6							Not available	None	Basic
Stone crab	*Lithodes maia*	6							Not available	None	Basic
A red seaweed	*Odonthalia dentata*	6							Not available	None	Basic
Bristly crab	*Pilumnus hirtellus*	6							Not available	None	Basic
Leopard-spotted goby	*Thorogobius ephippiatus*	6							Not available	None	Basic
Bottle-brush hydroid	*Thuiaria thuja*	6							Not available	None	Basic
Black faced blenny	*Tripterygion delaisi*	6							Not available	None	Basic
Montagu's crab	*Xantho incisus*	6							Not available	None	Basic
John dory	*Zeus faber*	6							Not available	None	Basic

Legend:
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Prioritization criteria: 1 = Statute, Habitats Directive Annex, Red list; UK BAP; 2 = Key, Representative/ Important characterizing; 3 = Exploited; 4 = Nationally rare or scarce; 5 = Non-native; 6 = Climate change; R = Research; E = Education.

Appendix 5i Basic information researched. Species information prepared for educational pages.

Common Name	Scientific name	Priority	UK BAP	W&C Act	Hab. Dir.	NI Act	CITES	Berne	Nat. status	Red list (IUCN)	Completion
Cloak anemone	*Adamsia carciniopados*	E							Not available	None	Basic
Red speckled anemone	*Anthopleura ballii*	E							Not available	None	Basic
Sea mouse	*Aphrodita aculeata*	E							Not available	None	Basic
A crab	*Bathynectes longipes*	E							Not available	None	Basic
A fanworm	*Bispira volutacornis*	E							Not available	None	Basic
Parasitic anemone	*Calliactis parasitica*	E							Not available	None	Basic
A red seaweed	*Catenella caespitosa*	E							Not available	None	Basic
Rock cook	*Centrolabrus exoletus*	E							Not available	None	Basic
Goldsinny	*Ctenolabrus rupestris*	E							Not available	None	Basic
Football sea squirt	*Diazona violacea*	E							Not available	None	Basic
Lesser weever fish	*Echiichthys vipera*	E							Not available	None	Basic
A zoanthid sea anemone	*Epizoanthus couchii*	E							Widespread	None	Basic
A sea anemone	*Halcampa chrysanthellum*	E							Not available	None	Basic
Herring-bone hydroid	*Halecium halecinum*	E							Not available	None	Basic
Thick-lipped dogwhelk	*Hinia incrassata*	E							Not available	None	Basic
Netted dogwhelk	*Hinia reticulata*	E							Not available	None	Basic
Common lobster	*Homarus gammarus*	E							Not available	None	Basic
A sea anemone	*Hormathia coronata*	E							Not available	None	Basic
A hydroid	*Hydractinia echinata*	E							Not available	None	Basic
Ballan wrasse	*Labrus bergylta*	E							Not available	None	Basic

Legend:
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Prioritization criteria: 1 = Statute, Habitats Directive Annex, Red list; UK BAP; 2 = Key, Representative/ Important characterizing; 3 = Exploited; 4 = Nationally rare or scarce; 5 = Non-native; 6 = Climate change; R = Research; E = Education.

Appendix 5i Basic information researched. Species information prepared for educational pages (continued).

Common Name	Scientific name	Priority	UK BAP	W&C Act	Hab. Dir.	NI Act	CITES	Berne	Nat. status	Red list (IUCN)	Completion
A bivalve mollusc	*Lasaea adansoni*	E							Not available	None	Basic
Shore clingfish	*Lepadogaster lepadogaster*	E							Not available	None	Basic
Flying crab	*Liocarcinus holsatus*	E							Not available	None	Basic
Marbled swimming crab	*Liocarcinus marmoreus*	E							Not available	None	Basic
Shanny	*Lipophrys pholis*	E							Not available	None	Basic
Flat periwinkle	*Littorina obtusata*	E							Not available	None	Basic
Common spider crab	*Maja squinado*	E							Not available	None	Basic
Sunfish	*Mola mola*	E							Not available	None	Basic
Hermit crab	*Pagurus bernhardus*	E							Not available	None	Basic
Hermit crab	*Pagurus prideaux*	E							Not available	None	Basic
Tompot blenny	*Parablennius gattorugine*	E							Not available	None	Basic
A burrowing sea anemone	*Peachia cylindrica*	E							Not available	None	Basic
Chalice sponge	*Phakellia ventilabrum*	E							Not available	None	Basic
A sea anemone	*Phellia gausapata*	E							Not available	None	Basic
A red seaweed	*Polysiphonia lanosa*	E							Not available	None	Basic
Broad-clawed porcelain crab	*Porcellana platycheles*	E							Not available	None	Basic
Purple laver	*Porphyra umbilicalis*	E							Not available	None	Basic
A sea anemone	*Sagartiogeton undatus*	E							Not available	None	Basic
Small-spotted catshark	*Scyliorhinus canicula*	E							Not available	None	Basic

Legend:
UK BAP = UK Biodiversity Action Plan; W&C Act = Wildlife & Conservation Act (1981); Hab. Dir. = EC Habitat Directive; NI Act = Wildlife (NI) Order 1985; CITES = CITES Convention; Berne = Berne Convention; Nat. Status = National Status; Completion = status of the Key Information review.

Prioritization criteria: 1 = Statute, Habitats Directive Annex, Red list; UK BAP; 2 = Key, Representative/ Important characterizing; 3 = Exploited; 4 = Nationally rare or scarce; 5 = Non-native; 6 = Climate change; R = Research; E = Education.

Appendix 5i Basic information researched. Species information prepared for educational pages (continued).

Common Name	Scientific name	Priority	UK BAP	W&C Act	Hab. Dir.	NI Act	CITES	Berne	Nat. status	Red list (IUCN)	Completion
Purple heart urchin	*Spatangus purpureus*	E							Not available	None	Basic
Orange sea grapes	*Stolonica socialis*	E							Not available	None	Basic
Great pipefish	*Syngnathus acus*	E							Not available	None	Basic
Thumbnail crab	*Thia scutellata*	E							Not available	None	Basic
By-the-wind-sailor	*Velella velella*	E							Not available	None	Basic

Legend:
UK BAP = UK Biodiversity Action Plan; W&C Act = Wildlife & Conservation Act (1981); Hab. Dir. = EC Habitat Directive; NI Act = Wildlife (NI) Order 1985; CITES = CITES Convention; Berne = Berne Convention; Nat. Status = National Status; Completion = status of the Key Information review.

Prioritization criteria: 1 = Statute, Habitats Directive Annex, Red list; UK BAP; 2 = Key, Representative/ Important characterizing; 3 = Exploited; 4 = Nationally rare or scarce; 5 = Non-native; 6 = Climate change; R = Research; E = Education.

Appendix 6 List of researched biotopes and their status at the end of the contract (November 2002). The number of images is given.

Biotope name	Biotope code	Image	Status	Referee
LITTORAL ROCK (and other hard substrata)				
LICHENS AND ALGAL CRUSTS				
Chrysophyceae on vertical upper littoral fringe soft rock.	LR.L.Chr	1	Refereed	Dr Ian Tittley
Yellow and grey lichens on supralittoral rock.	LR.L.YG	3	Signed-off and on-line	None
EXPOSED LITTORAL ROCK (mussel and barnacle shores)				
Mytilus edulis and barnacles on very exposed eulittoral rock.	ELR.MB. MytB	1	Signed-off and on-line	None
Barnacles and *Patella* spp. on exposed or moderately exposed, or vertical sheltered eulittoral rock.	ELR.MB.Bpat	1	Signed-off and on-line	None
Fucus distichus subsp. *anceps* and *Fucus spiralis* f. *nana* on extremely exposed upper eulittoral rock.	ELR.FR.Fdis	1	Signed-off and on-line	None
Corallina officinalis on very exposed lower eulittoral rock.	ELR.FR.Coff	2	Signed-off and on-line	None
Himanthalia elongata and red seaweeds on exposed lower eulittoral rock.	ELR.FR.Him	1	Signed-off and on-line	None
MODERATELY EXPOSED LITTORAL ROCK (barnacle and fucoid shores)				
Barnacles and fucoids (moderately exposed shores).	MLR.BF		Signed-off and on-line	None
Fucus serratus and under-boulder fauna on lower eulittoral boulders.	MLR.BF.Fser .Fser.Bo	1	Refereed	Dr Bob Foster-Smith
Ceramium sp. and piddocks on eulittoral fossilised peat.	MLR.R.RPid	1	Signed-off and on-line	None
Rhodothamniella floridula on sand-scoured lower eulittoral rock.	MLR.Eph.Rho	1	Signed-off and on-line	
Enteromorpha spp. on freshwater influenced or unstable upper eulittoral rock.	MLR.Eph.Ent	1	With referee	Dr Ian Tittley
Mytilus edulis and *Fucus vesiculosus* on moderately exposed mid-eulittoral rock).	MLR.MF .MytFves	1	Signed-off and on-line	
Sabellaria alveolata reefs on sand-abraded eulittoral rock.	MLR.Sab.Salv	1	Refereed	Dr Terry Holt

Biotope name	Biotope code	Image	Status	Referee
SHELTERED LITTORAL ROCK (fucoid shores)				
Ascophyllum nodosum on very sheltered mid eulittoral rock.	SLR.F.Asc	2	Signed-off and on-line	
Ascophyllum nodosum ecad *mackaii* beds on extremely sheltered mid eulittoral mixed substrata.	SLR.FX.AscX .mac	2	Signed-off and on-line	
Fucus ceranoides on reduced salinity eulittoral rock.	SLR.F.Fcer	1	Signed-off and on-line	
Fucus vesiculosus on mid eulittoral mixed substrata.	SLR.FX. FvesX	1	Signed-off and on-line	
Barnacles and *Littorina littorea* on unstable eulittoral mixed substrata.	SLR.FX.BLlit	2	Signed-off and on-line	
LITTORAL ROCK (other)				
Green seaweeds (*Enteromorpha* spp. and *Cladophora* spp.) in upper shore rockpools.	LR.Rkp.G	2	Signed-off and on-line	
Corallina officinalis and coralline crusts in shallow eulittoral rockpools.	LR.Rkp.Cor	1	Signed-off and on-line	
Overhangs and caves	LR.Ov	1	Refereed	Dr Bob Foster-Smith
Rhodothamniella floridula in littoral fringe soft rock caves.	LR.Ov.RhoCv		Signed-off and on-line	
LITTORAL SEDIMENTS				
LITTORAL GRAVELS AND SANDS				
Barren coarse sand shores.	LGS.S.BarSnd		With referee	Dr John Fish
Pectenogammarus planicrurus in mid shore well-sorted gravel or coarse sand.	LGS.Sh.Pec	1	Signed-off and on-line	
Talitrid amphipods in decomposing seaweed on the strandline.	LGS.S.Tal	2	Signed-off and on-line	
Burrowing amphipods and *Eurydice pulchra* in well-drained clean sand shores.	LGS.S.Aeur	1	With referee	Dr John Fish
Dense *Lanice conchilega* in tide-swept lower shore sand.	LGS.S.Lan	1	Signed-off and on-line	
LITTORAL MUDDY SANDS				
Muddy sand shores.	LMS.MS	1	Refereed	Mr Mike Kendall
Zostera noltii beds in upper to mid shore muddy sand.	LMS.Zos.Znol	4	Refereed	Dr Leigh Jones

Biotope name	Biotope code	Image	Status	Referee
LITTORAL MUDS				
Puccinella maritima saltmarsh community	LMU.Sm (low mid) (NVC SM13)	2	Signed-off and on-line	
Salicornia sp. pioneer saltmarsh	LMU.Sm (NVC SM8)	5	Signed-off and on-line	
Hediste diversicolor and *Macoma balthica* in sandy mud shores.	LMU.Smu .HedMac	1	Signed-off and on-line	
INFRALITTORAL ROCK (and other hard substrata)				
EXPOSED INFRALITTORAL ROCK				
Alaria esculenta on exposed sublittoral fringe rock.	EIR.KfaR.Ala	7	Refereed and updated	Dr Tim Hill
Laminaria hyperborea forest with a faunal cushion (sponges and polyclinids) and foliose red seaweeds on very exposed infralittoral rock.	EIR.KfaR .LhypFa	1	Signed-off and on-line	
Laminaria hyperborea with dense foliose red seaweeds on exposed infralittoral rock.	EIR.KfaR .LhypR	3	Refereed	Dr Joanna Jones (nee Kain)
Laminaria saccharina and/or *Saccorhiza polyschides* on exposed infralittoral rock.	EIR.KfaR .LsacSac	1	Signed-off and on-line	
Foliose red seaweeds on exposed or moderately exposed lower infralittoral rock.	EIR.KfaR.FoR	1	Signed-off and on-line	
Sponge crusts and anemones on wave-surged vertical infralittoral rock.	EIR.SG.SCAn	1	Signed-off and on-line	
MODERATELY EXPOSED INFRALITTORAL ROCK				
Laminaria digitata on moderately exposed sublittoral fringe rock.	MIR.KR.Ldig .Ldig	1	Signed-off and on-line	
Laminaria digitata and piddocks on sublittoral fringe soft rock.	MIR.KR.Ldig .Pid	1	Signed-off and on-line	
Sabellaria spinulosa with kelp and red seaweeds on sand-influenced infralittoral rock.	MIR.SedK .SabKR		Signed-off and on-line	
Grazed *Laminaria hyperborea* with coralline crusts on infralittoral rock	MIR.LhypGz	6	Signed-off and on-line	
Laminaria saccharina, *Chorda filum* and dense red seaweeds on shallow unstable infralittoral boulders and cobbles.	MIR.SedK .LsacChoR	2	Signed-off and on-line	
Halidrys siliquosa and mixed kelps on tide-swept infralittoral rock with coarse sediment.	MIR.SedK .HalXK	1	Signed-off and on-line	
Polyides rotundus, *Ahnfeltia plicata,* and *Chondrus crispus* on sand-covered infralittoral rock.	MIR.SedK .PolAhn		Signed-off and on-line	

Biotope name	Biotope code	Image	Status	Referee
SHELTERED INFRALITTORAL ROCK				
Laminaria saccharina park on very sheltered lower infralittoral rock.	SIR.K.Lsac.Pk	1	Signed-off and on-line	
Laminaria saccharina, foliose red seaweeds, sponges and ascidians on tide-swept infralittoral rock.	SIR.K.Lsac.T		Signed-off and on-line	
Laminaria saccharina on reduced salinity infralittoral rock.	SIR.K.LsacRS		Signed-off and on-line	
Mytilus edulis beds on reduced salinity tide-swept infralittoral rock.	SIR.EstFa .MytT		Signed-off and on-line	
Cordylophora caspia and *Electra crustulenta* on reduced salinity infralittoral rock.	SIR.EstFa .CorEle	2	Signed-off and on-line	
Hartlaubella gelatinosa and *Conopeum reticulum* on low salinity infralittoral mixed substrata.	SIR.EstFa .HarCon		Signed-off and on-line	
Mixed fucoids, *Chorda filum* and green seaweeds on reduced salinity infralittoral rock.	SIR.Lag.FCho G	1	Signed-off and on-line	
Ascophyllum nodosum with epiphytic sponges and ascidians on variable salinity infralittoral rock.	SIR.Lag.AscS As	1	Signed-off and on-line	
Polyides rotundus and/or *Furcellaria lumbricalis* on reduced salinity infralittoral rock.	SIR.Lag .PolFur	1	Signed-off and on-line	
INFRALITTORAL ROCK (other)				
Alcyonium digitatum and a bryozoan, hydroid and ascidian turf on moderately exposed vertical infralittoral rock.	IR.FaSwV .AlcBytH	6	Signed-off and on-line	
CIRCALITTORAL ROCK (and other hard substrata)				
EXPOSED CIRCALITTORAL ROCK				
Pomatoceros triqueter, *Balanus crenatus* and bryozoan crusts on mobile circalittoral cobbles and pebbles.	ECR.Efa .PomByC	2	Signed-off and on-line	
Halichondria bowerbanki, *Eudendrium arbusculum* and *Eucratea loricata* on reduced salinity tide-swept circalittoral mixed substrata.	ECR.BS .HbowEud		Signed-off and on-line	

Biotope name	Biotope code	Image	Status	Referee
MODERATELY EXPOSED CIRCALITTORAL ROCK				
Erect sponges, *Eunicella verrucosa* and *Pentapora fascialis* on slightly tide-swept moderately exposed circalittoral rock.	MCR.Xfa .ErSEun	7	Signed-off and on-line	
Flustra foliacea and other hydroid/bryozoan turf species on slightly scoured circalittoral rock or mixed substrata.	MCR.ByH.Flu	6	Signed-off and on-line	
Urticina felina on sand-affected circalittoral rock.	MCR.ByH.Urt	2	Signed-off and on-line	
Sabellaria spinulosa crusts on silty turbid circalittoral rock.	MCR.Csab .Sspi	1	Signed-off and on-line	
Mytilus edulis beds with hydroids and ascidians on tide-swept moderately exposed circalittoral rock.	MCR.M .MytHAs	1	Signed-off and on-line	
Musculus discors beds on moderately exposed circalittoral rock.	MCR.M.Mus		Signed-off and on-line	
Modiolus modiolus beds with hydroids and red seaweeds on tide-swept circalittoral mixed substrata.	MCR.M.ModT	1	Signed-off and on-line	
Ophiothrix fragilis and/or *Ophiocomina nigra* beds on slightly tide-swept circalittoral rock or mixed substrata.	MCR.Bri.Oph	3	Signed-off and on-line	
Faunal and algal crusts, *Echinus esculentus*, sparse *Alcyonium digitatum* and grazing-tolerant fauna on moderately exposed circalittoral rock.	MCR.GzFa .FaAlC	1	Signed-off and on-line	
Molgula manhattensis and *Polycarpa* spp. with erect sponges on tide-swept moderately exposed circalittoral rock.	MCR.As .MolPol	1	Signed-off and on-line	
Piddocks with a sparse associated fauna in upward-facing circalittoral very soft chalk or clay.	MCR.SfR.Pid	1	Signed-off and on-line	
Polydora sp. tubes on upward-facing circalittoral soft rock.	MCR.SfR.Pol	4	Signed-off and on-line	
SHELTERED CIRCALITTORAL ROCK				
Antedon spp., solitary ascidians and fine hydroids on sheltered circalittoral rock.	SCR.BrAs .AntAsH	6	Signed-off and on-line	
Suberites spp. and other sponges with solitary ascidians on very sheltered circalittoral rock.	SCR.BrAS .SubSoAs	1	Signed-off and on-line	
Neocrania anomala and *Protanthea simplex* on very sheltered circalittoral rock.	SCR.BrAs .NeoPro	3	Refereed	Matt Dalkin

Biotope name	Biotope code	Image	Status	Referee
CIRCALITTORAL ROCK (other)				
Bugula spp. and other bryozoans on vertical moderately exposed circalittoral rock.	CR.FaV.Bug	1	Signed-off and on-line	
Caves and overhangs (deep).	CR.Cv		Signed-off and on-line	
CIRCALITTORAL OFFSHORE ROCK (AND OTHER HARD SUBSTRATA)				
Lophelia reefs.	COR.Lop			
SUBLITTORAL SEDIMENTS				
INFRALITTORAL GRAVELS AND SANDS				
Phymatolithon calcareum maerl beds with hydroids and echinoderms in deeper infralittoral clean gravel or coarse sand .	IGS.Mrl.Phy .HEc	2	Refereed and updated	Dr Jason Hall-Spencer
Lithothamnion glaciale maerl beds in tide-swept variable salinity infralittoral gravel.	IGSMrl.Lgla	2	Signed-off and on-line	
Halcampa chrysanthellum and *Edwardsia timida* on sublittoral clean stone gravel.	IGS.FaG .HalEdw	1	Signed-off and on-line	
Nephtys cirrosa and *Bathyporeia* spp. in infralittoral sand.	IGS.FaS .NcirBat	1	Signed-off and on-line	
Dense *Lanice conchilega* and other polychaetes in tide-swept infralittoral sand.	IGS.FaS.Lcon	2	Signed-off and on-line	
Fabulina fabula and *Magelona mirabilis* with venerid bivalves in infralittoral compacted fine sand.	IGS.FaS .FabMag		Signed-off and on-line	
Neomysis integer and *Gammarus* spp. In low salinity infralittoral mobile sand.	IGS.EstGS .NeoGam		Signed-off and on-line	
CIRCALITTORAL GRAVELS AND SANDS				
Venerid bivalves in circalittoral coarse sand or gravel.	CGS.Ven	3	Signed-off and on-line	
INFRALITTORAL MUDDY SANDS				
Zostera marina/angustifolia beds in lower shore or infralittoral clean or muddy sand.	IMS.Sgr.Zmar	2	Refereed and updated	Dr Leigh Jones
Ruppia maritima in reduced salinity infralittoral muddy sand.	IMS.Sgr.Rup	1	Signed-off and on-line	
Echinocardium cordatum and *Ensis* sp. in lower shore or shallow sublittoral muddy fine sand.	IMS.FaMS .EcorEns	1	Signed-off and on-line	
Macoma balthica and *Abra alba* in infralittoral muddy sand or mud.	IMS.FaMS .MacAbr		Signed-off and on-line	
Capitella capitata in enriched sublittoral muddy sediments.	IMS.FaMS .Cap		Signed-off and on-line	

Biotope name	Biotope code	Image	Status	Referee
CIRCALITTORAL MUDDY SANDS				
Abra alba, *Nucula nitida* and *Corbula gibba* in circalittoral muddy sand or slightly mixed sediment.	CMS .AbrNucCor		Signed-off and on-line	
Amphiura filiformis and *Echinocardium cordatum* in circalittoral clean or slightly muddy sand.	CMS.AfilEcor	1	Refereed	Dr David J. Hughes
Virgularia mirabilis and *Ophiura* spp. on circalittoral sandy or shelly mud.	CMS.VirOph	1	Refereed	Dr David J. Hughes
Serpula vermicularis reefs on very sheltered circalittoral muddy sand.	CMS.Ser	1	Signed-off and on-line	
INFRALITTORAL MUDS				
Potamogeton pectinatus community.	IMU.Ang .NVC A12		Signed-off and on-line	
Phragmites australis swamp and reed beds.	IMU.Ang .NVC S4		Signed-off and on-line	
Semi-permanent tube-building amphipods and polychaetes in sublittoral mud or muddy sand.	IMU.MarMu .TubeAP		Refereed and updated	Prof. Jean-Claude Dauvin
Arenicola marina and synaptid holothurians in extremely shallow soft mud.	IMU.MarMu .AreSyn	3	Signed-off and on-line	
Philine aperta and *Virgularia mirabilis* in soft stable infralittoral mud.	IMU.MarMu .PhiVir	1	Signed-off and on-line	
Ocnus planci aggregations on sheltered sublittoral muddy sediment.	IMU.MarMu .Ocn	2	Signed-off and on-line	
Polydora ciliata in variable salinity infralittoral firm mud or clay.	IMU.EstMu .PolVS		Signed-off and on-line	
Aphelochaeta marioni and *Tubificoides* spp. in variable salinity infralittoral mud.	IMU.EstMu .AphTub		Signed-off and on-line	
Limnodrilus hoffmeisteri, *Tubifex tubifex* and *Gammarus* spp. in low salinity infralittoral muddy sediment.	IMU.EstMu .LimTtub		Signed-off and on-line	
CIRCALITTORAL MUDS				
Brissopsis lyrifera and *Amphiura chiajei* in circalittoral mud.	CMU.BriAchi		With referee	Dr Karin Hollertz,
Seapens and burrowing megafauna in circalittoral soft mud.	CMU.SpMeg	1	Refereed and updated	Dr David J. Hughes
Beggiatoa spp. on anoxic sublittoral mud.	CMU.Beg	1	Signed-off and on-line	

Biotope name	Biotope code	Image	Status	Referee
INFRALITTORAL MIXED SEDIMENT				
Laminaria saccharina, Chorda filum and filamentous red seaweeds on sheltered infralittoral sediment.	IMX.KSwMx .LsacX	2	Signed-off and on-line	
Filamentous green seaweeds on low salinity infralittoral mixed sediment or rock.	IMX.KSwMx .FiG	1	Signed-off and on-line	
Ostrea edulis beds on shallow sublittoral muddy sediment.	IMX.Oy.Ost	1	Signed-off and on-line	
Venerupis senegalensis and *Mya truncata* in lower shore or infralittoral muddy gravel.	IMX.FaMx .VsenMtru		Signed-off and on-line	
Burrowing anemones in sublittoral muddy gravel.	IMX.FaMx.An		Signed-off and on-line	
Limaria hians beds in tide-swept sublittoral muddy mixed sediment.	IMX.FaMx .Lim	1	Signed-off and on-line	
Crepidula fornicata and *Aphelochaeta marioni* in variable salinity infralittoral mixed sediment.	IMX.EstMx .CreAph	1	Signed-off and on-line	
Mytilus edulis beds in variable salinity infralittoral mixed sediment.	IMX.EstMx .MytV		Signed-off and on-line	
Polydora ciliata, *Mya truncata* and solitary ascidians in variable salinity infralittoral mixed sediment.	IMX.EstMx .PolMtru		Signed-off and on-line	
CIRCALITTORAL OFFSHORE SEDIMENTS				
Ampharete falcata turf with *Parvicardium ovale* on cohesive muddy very fine sand near margins of deep stratified seas.	COS.AmpPar		Signed-off and on-line	
Foramaniferans and *Thyasira* sp. in deep circalittoral soft mud.	COS.ForThy		Signed-off and on-line	
Styela gelatinosa and other solitary ascidians on sheltered deep circalittoral muddy sediment.	COS.Sty		Signed-off and on-line	

Appendix 7 The marine natural heritage importance of the researched biotopes. UK BAP = UK Biodiversity Action Plan. Reefs, Caves, Sandflats, Sandbanks, Bays, Estuaries, and Lagoons refer to the relevant Annex 1 habitats of the Habitats Directive.

Biotope name	Biotope code	EC Habitats Directive	Reefs	Caves	Sandflats	Sandbanks	Bays	Estuaries	Lagoons	UK BAP	UK BAP Habitat	National Status
Venerid bivalves in circalittoral coarse sand or gravel	CGS.Ven	●				●	●	●		●	Sublittoral sands and gravel	Not available
Abra alba, *Nucula nitida* and *Corbula gibba* in circalittoral muddy sand or slightly mixed sediment	CMS.AbrNucCor	●					●			●	Mud habitats in deep water	Not available
Amphiura filiformis and *Echinocardium cordatum* in circalittoral clean or slightly muddy sand	CMS.AfilEcor	●					●					Not available
Serpula vermicularis reefs on very sheltered circalittoral muddy sand	CMS.Ser	●	●				●			●	*Serpula vermicularis* reefs	Rare
Virgularia mirabilis and *Ophiura* spp. on circalittoral sandy or shelly mud	CMS.VirOph	●					●			●	Mud habitats in deep water	Common
Beggiatoa spp. on anoxic sublittoral mud	CMU.Beg	●					●		●	●	Saline lagoons, Mud habitats in deep water	Not available
Brissopsis lyrifera and *Amphiura chiajei* in circalittoral mud	CMU.BriAchi	●					●			●	Mud habitats in deep water	Not available
Seapens and burrowing megafauna in circalittoral soft mud	CMU.SpMeg	●					●			●	Mud habitats in deep water	Not available
Lophelia reefs	COR.Lop	●	●							●	*Lophelia pertusa* reefs, Offshore shelf rock (broad habitat statement)	Not available
Ampharete falcata turf with *Parvicardium ovale* on cohesive muddy very fine sand near margins of deep stratified seas	COS.AmpPar									●	Mud habitats in deep water	Scarce
Foraminiferans and *Thyasira* sp. in deep circalittoral soft mud	COS.ForThy									●	Mud habitats in deep water	Not available
Styela gelatinosa and other solitary ascidians on very sheltered deep circalittoral muddy sediment	COS.Sty									●	Mud habitats in deep water	Rare
Bugula spp. and other bryozoans on vertical moderately exposed circalittoral rock.	CR.Bug	●	●	●			●					Not available
Caves and overhangs (deep)	CR.Cv	●	●	●			●					Scarce
Halichondria bowerbanki, *Eudendrium arbusculum* and *Eucratea loricata* on reduced salinity tide-swept circalittoral mixed substrata	ECR.HbowEud	●	●				●					Rare
Pomatoceros triqueter, *Balanus crenatus* and bryozoan crusts on mobile circalittoral cobbles and pebbles	ECR.PomByC	●	●									Not available

Biotope name	Biotope code	EC Habitats Directive	Reefs	Caves	Sandflats	Sandbanks	Bays	Estuaries	Lagoons	UK BAP	UK BAP Habitat	National Status
Alaria esculenta on exposed sublittoral fringe bedrock	EIR.Ala	●	●							●	Inshore sublittoral rock (broad habitat statement)	Widespread
Foliose red seaweeds on exposed or moderately exposed lower infralittoral rock	EIR.FoR	●	●				●			●	Inshore sublittoral rock (broad habitat statement)	Not available
Laminaria hyperborea forest with a faunal cushion (sponges and polyclinids) and foliose red seaweeds on very exposed upper infralittoral rock	EIR.LhypFa	●	●				●			●	Inshore sublittoral rock (broad habitat statement)	Uncommon
Laminaria hyperborea with dense foliose red seaweeds on exposed infralittoral rock.	EIR.LhypR	●	●				●			●	Inshore sublittoral rock (broad habitat statement)	Not available
Laminaria saccharina and/or *Saccorhiza polyschides* on exposed infralittoral rock	EIR.LsacSac	●	●							●	Inshore sublittoral rock (broad habitat statement)	Not available
Sponge crusts and anemones on wave-surged vertical infralittoral rock	EIR.SCAn	●	●	●			●			●	Inshore sublittoral rock (broad habitat statement)	Not available
Barnacles and *Patella* spp. on exposed or moderately exposed, or vertical sheltered, eulittoral rock	ELR.BPat	●	●				●	●	●	●	Saline lagoons, Littoral rock (broad habitat statement)	Widespread
Corallina officinalis on very exposed lower eulittoral rock	ELR.Coff	●	●							●	Littoral rock (broad habitat statement)	Scarce
Fucus distichus and *Fucus spiralis* f. *nana* on extremely exposed upper shore rock	ELR.Fdis	●	●							●	Littoral rock (broad habitat statement)	Rare
Himanthalia elongata and red seaweeds on exposed lower eulittoral rock	ELR.Him	●	●				●			●	Littoral rock (broad habitat statement)	Common
Mytilus edulis and barnacles on very exposed eulittoral rock	ELR.MytB	●	●				●			●	Littoral rock (broad habitat statement)	Common
Fabulina fabula and *Magelona mirabilis* with venerid bivalves in infralittoral compacted fine sand	IGS.FabMag	●				●	●	●		●	Sublittoral sands and gravels, Inshore sublittoral sediment (broad habitat statement)	Not available

Biotope name	Biotope code	EC Habitats Directive	Reefs	Caves	Sandflats	Sandbanks	Bays	Estuaries	Lagoons	UK BAP	UK BAP Habitat	National Status
Halcampa chrysanthellum and *Edwardsia timida* on sublittoral clean stone gravel	IGS.HalEdw	●					●			●	Sublittoral sands and gravels, Inshore sublittoral sediment (broad habitat statement)	Scarce
Dense *Lanice conchilega* and other polychaetes in tide-swept infralittoral sand	IGS.Lcon	●				●	●	●		●	Sublittoral sands and gravels, Inshore sublittoral sediment (broad habitat statement)	Not available
Lithothamnion glaciale maerl beds in tide-swept variable salinity infralittoral gravel	IGS.Lgla	●				●	●		●	●	Maerl beds, Saline lagoons, Sublittoral sands and gravels, Inshore sublittoral sediment (broad habitat statement)	Scarce
Nephtys cirrosa and *Bathyporeia* spp. in infralittoral sand	IGS.NcirBat	●				●	●	●		●	Sublittoral sands and gravels, Inshore sublittoral sediment (broad habitat statement)	Not available
Neomysis integer and *Gammarus* spp. in low salinity infralittoral mobile sand	IGS.NeoGam	●				●		●		●	Sublittoral sands and gravels, Inshore sublittoral sediment (broad habitat statement)	Not available
Phymatolithon calcareum maerl beds with hydroids and echinoderms in deeper infralittoral clean gravel or coarse sand	IGS.Phy.HEc	●				●	●			●	Maerl beds, Sublittoral sands and gravels, Inshore sublittoral sediment (broad habitat statement)	Uncommon

Biotope name	Biotope code	EC Habitats Directive	Reefs	Caves	Sandflats	Sandbanks	Bays	Estuaries	Lagoons	UK BAP	UK BAP Habitat	National Status
Capitella capitata in enriched sublittoral muddy sediments	IMS.Cap	●				●	●	●	●	●	Saline lagoons, Inshore sublittoral sediment (broad habitat statement)	Not available
Echinocardium cordatum and *Ensis* spp. in lower shore or shallow sublittoral muddy fine sand.	IMS.EcorEns	●				●	●			●	Inshore sublittoral sediment (broad habitat statement)	Uncommon
Macoma balthica and *Abra alba* in infralittoral muddy sand or mud	IMS.MacAbr	●				●	●	●		●	Inshore sublittoral sediment (broad habitat statement)	Not available
Ruppia maritima in reduced salinity infralittoral muddy sand	IMS.Rup	●				●		●	●	●	Saline lagoons, Inshore sublittoral sediment (broad habitat statement)	Uncommon
Zostera marina/angustifolia beds in lower shore or infralittoral clean or muddy sand	IMS.Zmar	●			●	●	●	●	●	●	Seagrass beds, Saline lagoons, Inshore sublittoral sediment (broad habitat statement)	Uncommon
Aphelochaeta marioni and *Tubificoides* spp. in variable salinity infralittoral mud	IMU.AphTub	●						●		●	Inshore sublittoral sediment (broad habitat statement)	Not available
Arenicola marina and synaptid holothurians in extremely shallow soft mud.	IMU.AreSyn	●					●		●	●	Saline lagoons Inshore sublittoral sediment (broad habitat statement)	Not available
Limnodrilus hoffmeisteri, *Tubifex tubifex* and *Gammarus* spp. in low salinity infralittoral muddy sediment	IMU.LimTtub	●						●		●	Inshore sublittoral sediment (broad habitat statement)	Not available
Potamogeton pectinatus community	IMU.NVC_A12	●							●	●	Saline lagoons, Inshore sublittoral sediment (broad habitat statement)	Scarce

Biotope name	Biotope code	EC Habitats Directive	Reefs	Caves	Sandflats	Sandbanks	Bays	Estuaries	Lagoons	UK BAP	UK BAP Habitat	National Status
Phragmites australis swamp and reed beds	IMU.NVC_S4	●							●	●	Reedbeds, Saline lagoons Coastal saltmarsh	Scarce
Ocnus planci aggregations on sheltered sublittoral muddy sediment	IMU.Ocn	●					●			●	Inshore sublittoral sediment (broad habitat statement)	Rare
Philine aperta and *Virgularia mirabilis* in soft stable infralittoral mud	IMU.PhiVir	●					●		●	●	Saline lagoons, Mud habitats in deep water Inshore sublittoral sediment (broad habitat statement)	Uncommon
Polydora ciliata in variable salinity infralittoral firm mud or clay	IMU.PolVS	●						●		●	Inshore sublittoral sediment (broad habitat statement)	Not available
Semi-permanent tube-building amphipods and polychaetes in sublittoral mud or muddy sand	IMU.TubeAP	●					●			●	Inshore sublittoral sediment (broad habitat statement)	Not available
Burrowing anemones in sublittoral muddy gravel	IMX.An	●					●	●		●	Sheltered muddy gravels, Inshore sublittoral sediment (broad habitat statement)	Not available
Crepidula fornicata and *Aphelochaeta marioni* in variable salinity infralittoral mixed sediment	IMX.CreAph	●						●	●	●	Saline lagoons, Sheltered muddy gravels Inshore sublittoral sediment (broad habitat statement)	Not available
Filamentous green seaweeds on low salinity infralittoral mixed sediment or rock	IMX.FiG	●						●	●	●	Saline lagoons, Inshore sublittoral sediment (broad habitat statement)	Scarce
Limaria hians beds in tide-swept sublittoral muddy mixed sediment	IMX.Lim	●					●			●	Inshore sublittoral sediment (broad habitat statement)	Scarce

Biotope name	Biotope code	EC Habitats Directive	Reefs	Caves	Sandflats	Sandbanks	Bays	Estuaries	Lagoons	UK BAP	UK BAP Habitat	National Status
Laminaria saccharina, *Chorda filum* and filamentous red seaweeds on sheltered infralittoral sediment	IMX.LsacX	●					●	●	●	●	Saline lagoons, Inshore sublittoral sediment (broad habitat statement)	Not available
Mytilus edulis beds on variable salinity infralittoral mixed sediment	IMX.MytV	●	●				●	●		●	Inshore sublittoral sediment (broad habitat statement)	Uncommon
Ostrea edulis beds on shallow sublittoral muddy sediment	IMX.Ost	●					●	●		●	Sheltered muddy gravels, Inshore sublittoral sediment (broad habitat statement)	Scarce
Polydora ciliata, *Mya truncata* and solitary ascidians in variable salinity infralittoral mixed sediment.	IMX.PolMtru	●						●		●	Sheltered muddy gravels, Inshore sublittoral sediment (broad habitat statement)	Not available
Venerupis senegalensis and *Mya truncata* in lower shore or infralittoral muddy gravel	IMX.VsenMtru	●					●	●	●	●	Saline lagoons, Sheltered muddy gravels, Inshore sublittoral sediment (broad habitat statement)	Scarce
Alcyonium digitatum with a bryozoan, hydroid and ascidian turf on moderately exposed vertical infralittoral rock	IR.AlcByH	●	●				●			●	Littoral and sublittoral chalk, Inshore sublittoral rock (broad habitat statement).	Common
Burrowing amphipods and *Eurydice pulchra* in well-drained clean sand shores	LGS.AEur	●			●		●			●	Littoral sediment (broad habitat statement)	Common
Barren coarse sand shores	LGS.BarSnd	●			●		●	●		●	Littoral sediment (broad habitat statement)	Common
Dense *Lanice conchilega* in tide-swept lower shore sand	LGS.Lan	●			●		●	●		●	Littoral sediment (broad habitat statement)	Uncommon
Pectenogammarus planicrurus in mid shore well-sorted gravel or coarse sand	LGS.Pec	●					●				Littoral sediment (broad habitat statement)	Scarce

Biotope name	Biotope code	EC Habitats Directive	Reefs	Caves	Sandflats	Sandbanks	Bays	Estuaries	Lagoons	UK BAP	UK BAP Habitat	National Status
Talitrid amphipods in decomposing seaweed on the strand-line	LGS.Tal	●			●		●	●	●	●	Saline lagoons, Supralittoral sediment (broad habitat statement),	Widespread
Muddy sand shores	LMS.MS	●			●		●	●	●	●	Saline lagoons, Mudflats, Littoral sediment (broad habitat statement)	Common
Zostera noltii beds in upper to mid shore muddy sand	LMS.Znol	●			●		●	●	●	●	Seagrass beds, Saline lagoons, Littoral sediment (broad habitat statement)	Scarce
Hediste diversicolor and *Macoma balthica* in sandy mud shores	LMU.HedMac	●			●			●		●	Mudflats, Littoral sediment (broad habitat statement)	Common
Puccinellia maritima saltmarsh community	LMU.NVC_SM13	●						●	●	●	Coastal and floodplain grazing marsh, Coastal saltmarsh, Saline lagoons, Littoral sediment (broad habitat statement)	Not available
Pioneer saltmarsh.	LMU.Sm	●						●		●	Coastal and floodplain grazing marsh, Coastal saltmarsh, Littoral sediment (broad habitat statement)	Not available
Chrysophyceae on vertical upper littoral fringe soft rock	LR.Chr	●	●				●			●	Littoral and sublittoral chalk, Maritime cliff and slopes, Supralittoral rock (broad habitat statement)	Rare
Corallina officinalis and coralline crusts in shallow eulittoral rockpools	LR.Cor	●	●				●	●	●	●	Saline lagoons, Littoral rock (broad habitat statement)	Widespread

Biotope name	Biotope code	EC Habitats Directive	Reefs	Caves	Sandflats	Sandbanks	Bays	Estuaries	Lagoons	UK BAP	UK BAP Habitat	National Status
Green seaweeds (*Enteromorpha* spp. and *Cladophora* spp.) in upper shore rockpools	LR.G	●	●				●	●		●	Littoral rock (broad habitat statement), Supralittoral rock (broad habitat statement)	Widespread
Overhangs and caves	LR.Ov	●	●	●			●	●		●	Littoral rock (broad habitat statement)	Scarce
Rhodothamniella floridula in upper littoral fringe soft rock caves	LR.RhoCv	●	●	●			●	●		●	Littoral and sublittoral chalk, Maritime cliffs and slopes, Littoral rock (broad habitat statement)	Rare
Yellow and grey lichens on supralittoral rock	LR.YG	●	●				●	●	●	●	Maritime cliff and slopes, Saline lagoons, Supralittoral rock (broad habitat statement) Littoral rock (broad habitat statement)	Widespread
Erect sponges, *Eunicella verrucosa* and *Pentapora fascialis* on slightly tide-swept moderately exposed circalittoral rock.	MCR.ErSEun	●	●				●					Not available
Faunal and algal crusts, *Echinus esculentus*, sparse *Alcyonium digitatum* and grazing-tolerant fauna on moderately exposed circalittoral rock	MCR.FaAlC	●	●				●					Not available
Flustra foliacea and other hydroid/bryozoan turf species on slightly scoured circalittoral rock or mixed substrata	MCR.Flu	●	●				●					Not available
Modiolus modiolus beds with hydroids and red seaweeds on tide-swept circalittoral mixed substrata	MCR.ModT	●	●				●			●	*Modiolus modiolus* beds, Tidal rapids	Uncommon
Molgula manhattensis and *Polycarpa* spp. with erect sponges on tide-swept moderately exposed circalittoral rock	MCR.MolPol	●	●				●					Uncommon
Musculus discors beds on moderately exposed circalittoral rock	MCR.Mus	●	●				●					Uncommon
Mytilus edulis beds with hydroids and ascidians on tide-swept moderately exposed circalittoral rock	MCR.MytHAs	●	●				●	●				Not available
Ophiothrix fragilis and/or *Ophiocomina nigra* beds on slightly tide-swept circalittoral rock or mixed substrata	MCR.Oph	●	●			●	●					Widespread

Biotope name	Biotope code	EC Habitats Directive	Reefs	Caves	Sandflats	Sandbanks	Bays	Estuaries	Lagoons	UK BAP	UK BAP Habitat	National Status
Piddocks with a sparse associated fauna in upward-facing circalittoral very soft chalk or clay	MCR.Pid	●	●				●	●		●	Littoral and sublittoral chalk, Littoral rock (broad habitat statement)	Scarce
Polydora sp. tubes on upward-facing circalittoral soft rock	MCR.Pol	●	●				●			●	Littoral and sublittoral chalk, Littoral rock (broad habitat statement)	Not available
Sabellaria spinulosa crusts on silty turbid circalittoral rock	MCR.Sspi	●	●				●			●	*Sabellaria spinulosa* reefs	Not available
Urticina felina on sand-affected circalittoral rock	MCR.Urt	●	●	●			●	●				Not available
Halidrys siliquosa and mixed kelps on tide-swept infralittoral rock with coarse sediment.	MIR.HalXK	●	●				●		●	●	Saline lagoons, Inshore sublittoral rock (broad habitat statement)	Not available
Laminaria digitata on moderately exposed sublittoral fringe rock	MIR.Ldig.Ldig	●	●				●	●	●	●	Saline lagoons, Inshore sublittoral rock (broad habitat statement)	Widespread
Laminaria digitata and piddocks on sublittoral fringe soft rock	MIR.Ldig.Pid	●	●				●	●		●	Littoral and sublittoral chalk	Scarce
Grazed *Laminaria hyperborea* with coralline crusts on infralittoral rock	MIR.LhypGz	●	●				●			●	Inshore sublittoral rock (broad habitat statement)	Not available
Laminaria saccharina, *Chorda filum* and dense red seaweeds on shallow unstable infralittoral boulders or cobbles	MIR.LsacChoR	●	●							●	Sublittoral sands and gravels, Inshore sublittoral rock (broad habitat statement)	Not available
Polyides rotundus, *Ahnfeltia plicata* and *Chondrus crispus* on sand-covered infralittoral rock	MIR.PolAhn	●	●				●			●	Inshore sublittoral rock (broad habitat statement)	Uncommon
Sabellaria spinulosa with kelp and red seaweeds on sand-influenced infralittoral rock	MIR.SabKR	●	●							●	*Sabellaria spinulosa* reefs, Inshore sublittoral rock (broad habitat statement)	Not available
Barnacles and fucoids (moderately exposed shores)	MLR.BF		●				●	●		●	Littoral rock (broad habitat statement)	Widespread

Biotope name	Biotope code	EC Habitats Directive	Reefs	Caves	Sandflats	Sandbanks	Bays	Estuaries	Lagoons	UK BAP	UK BAP Habitat	National Status
Enteromorpha spp. on freshwater-influenced or unstable upper eulittoral rock	MLR.Ent	●	●				●	●	●	●	Saline lagoons, Littoral rock (broad habitat statement)	Uncommon
Underboulder communities	MLR.Fser.Fser.Bo	●	●				●	●		●	Littoral rock (broad habitat statement)	Common
Mytilus edulis and *Fucus vesiculosus* on moderately exposed mid eulittoral rock	MLR.MytFves	●	●				●	●		●	Littoral rock (broad habitat statement)	Scarce
Rhodothamniella floridula on sand-scoured lower eulittoral rock	MLR.Rho	●	●				●	●	●	●	Saline lagoons, Littoral rock (broad habitat statement)	Uncommon
Ceramium sp. and piddocks on eulittoral fossilised peat	MLR.RPid	●	●				●	●		●	Littoral rock (broad habitat statement)	Rare
Sabellaria alveolata reefs on sand-abraded eulittoral rock	MLR.Salv	●	●				●	●		●	*Sabellaria alveolata* reefs, Littoral rock (broad habitat statement)	Scarce
Antedon spp., solitary ascidians and fine hydroids on sheltered circalittoral rock	SCR.AntAsH	●	●				●					Uncommon
Neocrania anomala and *Protanthea simplex* on very sheltered circalittoral rock	SCR.NeoPro	●	●				●					Uncommon
Suberites spp. and other sponges with solitary ascidians on very sheltered circalittoral rock	SCR.SubSoAs	●	●				●					Not available
Ascophyllum nodosum with epiphytic sponges and ascidians on variable salinity infralittoral rock	SIR.AscSAs	●	●						●	●	Saline lagoons, Inshore sublittoral rock (broad habitat statement)	Rare
Cordylophora caspia and *Electra crustulenta* on reduced salinity infralittoral rock	SIR.CorEle	●	●					●		●	Inshore sublittoral rock (broad habitat statement)	Rare
Mixed fucoids, *Chorda filum* and green seaweeds on reduced salinity infralittoral rock	SIR.FChoG	●	●						●	●	Saline lagoons, Inshore sublittoral rock (broad habitat statement)	Scarce
Hartlaubella gelatinosa and *Conopeum reticulum* on low salinity infralittoral mixed substrata	SIR.HarCon	●	●					●		●	Inshore sublittoral rock (broad habitat statement)	Rare

Biotope name	Biotope code	EC Habitats Directive	Reefs	Caves	Sandflats	Sandbanks	Bays	Estuaries	Lagoons	UK BAP	UK BAP Habitat	National Status
Laminaria saccharina park on very sheltered lower infralittoral rock	SIR.Lsac.Pk	●	●				●	●	●	●	Saline lagoons, Inshore sublittoral rock (broad habitat statement)	Uncommon
Laminaria saccharina, foliose red seaweeds, sponges and ascidians on tide-swept infralittoral rock	SIR.Lsac.T		●				●	●	●	●	Tidal rapids, Saline lagoons, Inshore sublittoral rock (broad habitat statement)	Scarce
Laminaria saccharina on reduced or low salinity infralittoral rock	SIR.LsacRS	●	●				●	●	●	●	Saline lagoons, Inshore sublittoral rock (broad habitat statement)	Not available
Mytilus edulis beds on reduced salinity tide-swept infralittoral rock	SIR.MytT	●	●					●		●	Tidal rapids, Inshore sublittoral rock (broad habitat statement)	Scarce
Polyides rotundus and/or *Furcellaria lumbricalis* on reduced salinity infralittoral rock	SIR.PolFur	●	●						●	●	Saline lagoons, Inshore sublittoral rock (broad habitat statement)	Rare
Ascophyllum nodosum on very sheltered mid eulittoral rock.	SLR.Asc	●	●				●	●	●	●	Saline lagoons, Littoral rock (broad habitat statement)	Widespread
Ascophyllum nodosum ecad *mackaii* beds on extremely sheltered mid eulittoral mixed substrata	SLR.AscX.mac	●	●				●		●	●	Saline lagoons, *Ascophyllum nodosum* ecad *mackaii* beds, Littoral rock (broad habitat statement)	Scarce
Barnacles and *Littorina littorea* on unstable eulittoral mixed substrata	SLR.BLit	●	●				●	●	●	●	Saline lagoons, Littoral rock (broad habitat statement)	Rare
Fucus ceranoides on reduced salinity eulittoral rock	SLR.Fcer	●	●					●	●	●	Saline lagoons, Littoral rock (broad habitat statement)	Scarce
Fucus vesiculosus on mid eulittoral mixed substrata	SLR.FvesX	●	●				●	●	●	●	Saline lagoons, Littoral rock (broad habitat statement)	Common

Annex Organizations and their representatives who have contributed to the development of the Marine Life Information Network for Britain and Ireland (*MarLIN*) as of November 2002

Funding organizations

Associated British Ports (ABP)
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(continued overleaf ……)

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