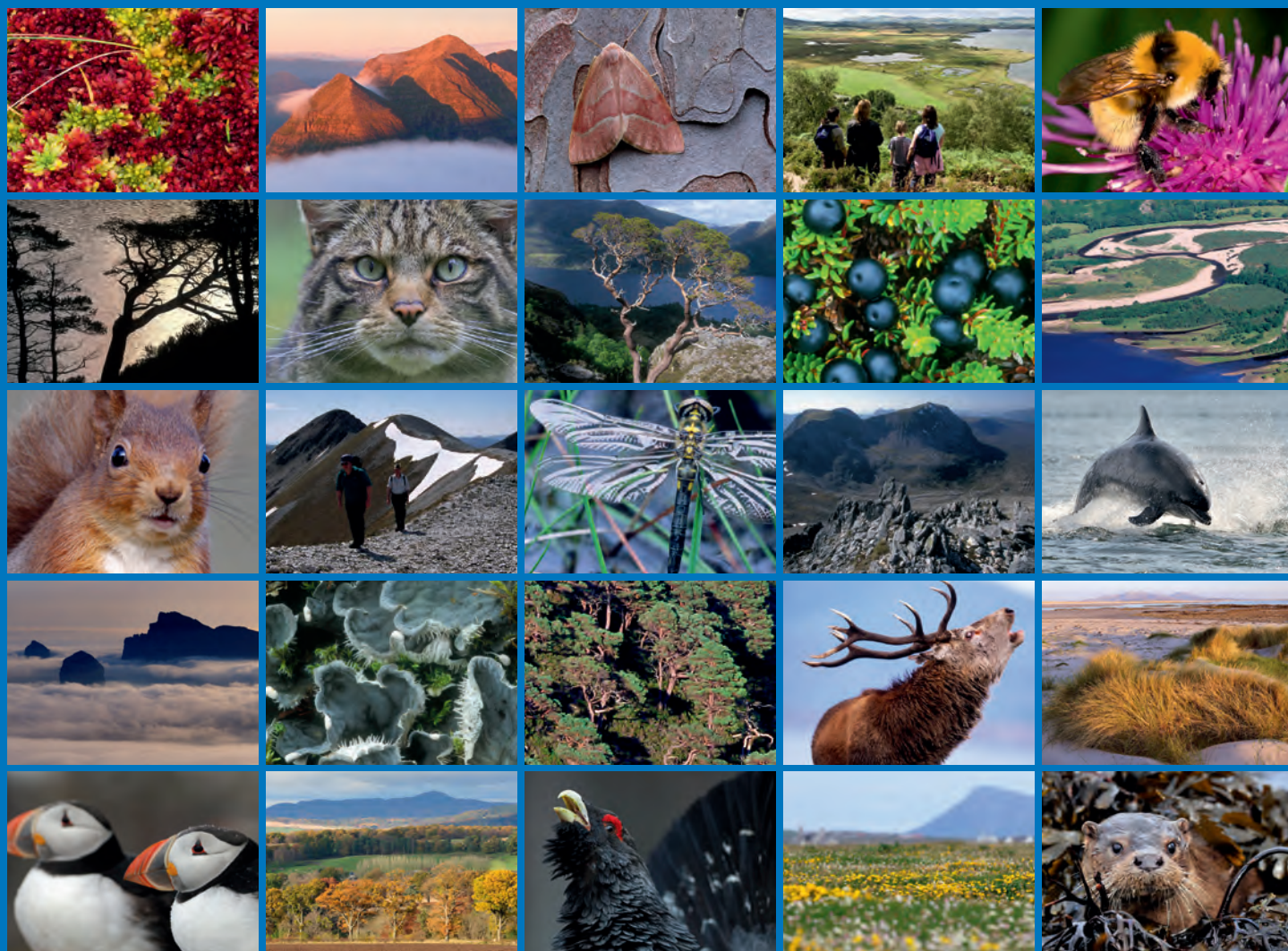


# Identification of Priority Marine Features in Scottish territorial waters





**Scottish Natural Heritage**  
**Dualchas Nàdair na h-Alba**

All of nature for all of Scotland  
Nàdar air fad airson Alba air fad

# COMMISSIONED REPORT

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**Commissioned Report No. 388**

## **Identification of Priority Marine Features in Scottish territorial waters**

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## COMMISSIONED REPORT

# Summary

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## Identification of Priority Marine Features in Scottish territorial waters

Commissioned Report No. 388 (*iBids and Project n<sup>o</sup>, 6216*)

Contractor: Christine Howson

Year of publication: 2012

### Background

There are a number of statutory requirements and policy initiatives of relevance to the conservation and management of the Scottish marine environment and its biodiversity. Amongst these statutory and policy drivers are OSPAR<sup>1</sup>, the Habitats and Birds Directives<sup>2</sup>, the Marine Strategy Framework Directive<sup>3</sup>, the Marine and Coastal Access Act 2009 and the Marine (Scotland) Act 2010<sup>4</sup>, the Scottish Biodiversity Strategy (SBS)<sup>5</sup> and the Marine Biodiversity Implementation Plan (MBIP)<sup>6</sup>. As this catalogue has grown, so the number of marine species and habitats recognised as being of conservation importance has increased. For practical conservation purposes, Scottish Natural Heritage, on behalf of Marine Scotland, has embarked on an exercise to identify a subset of those recognised marine habitats and species on which to focus their marine nature conservation work in the future. This is part of a broader process to identify:

- a) features of marine nature conservation importance for which it would be appropriate to use area-based mechanisms such as marine planning or Marine Protected Areas to achieve better protection;
- b) features of marine nature conservation importance for which non-area based mechanisms would be appropriate;
- c) features of functional importance to Scotland's seas, with the expectation that these features will be at a landscape-scale, i.e. not individual habitats or species.

This report describes the process which was developed and used to identify a list of priority marine habitats and species of marine nature conservation importance for which it would be

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<sup>1</sup> The OSPAR Commission for the protection of the marine environment of the North-East Atlantic. More information at: <http://www.ospar.org/>

<sup>2</sup> Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora and Council Directive 2009/147/EC of 30 November 2009 on the conservation of wild birds (codified version), enacted in Scotland through The Conservation (Natural Habitats, etc) Regulations 1994 (as amended, 2004) information at: <http://www.scotland.gov.uk/library3/nature/habd-00.asp>

<sup>3</sup> Marine Strategy Framework Directive information at: [http://ec.europa.eu/environment/water/marine/index\\_en.htm](http://ec.europa.eu/environment/water/marine/index_en.htm)

<sup>4</sup> Scottish Marine Act at: [http://www.oqps.gov.uk/legislation/acts/acts2010/pdf/asp\\_20100005\\_en.pdf](http://www.oqps.gov.uk/legislation/acts/acts2010/pdf/asp_20100005_en.pdf)  
UK Marine and Coastal Access Act at: [http://www.opsi.gov.uk/acts/acts2009/ukpga\\_20090023\\_en\\_1](http://www.opsi.gov.uk/acts/acts2009/ukpga_20090023_en_1)

<sup>5</sup> Scottish Biodiversity Strategy information at: <http://www.biodiversityscotland.gov.uk/pageType1.php?id=2&type=1&navID=27>

<sup>6</sup> Marine Biodiversity Implementation plan at: <http://www.biodiversityscotland.gov.uk/library/Marine%20IIP.pdf>

appropriate to use both area-based and non area-based mechanisms to achieve better protection, thus fulfilling a) and b) above. It is intended that the list will be used as the basis for focusing marine conservation action in Scottish territorial waters.

Ultimately it is proposed that the features identified here will be combined with species and habitats identified in offshore waters to form a recommended list of priority features of conservation importance across Scotland's seas.

## Summary

This report details stage 4 of the Priority Marine Features project. Earlier stages of the project compiled a long list of marine features (habitat types at various scales and species) already listed as being of nature conservation importance and present within the 12 nm limit around Scotland. This consisted of 324 species and 151 habitat types. A set of criteria was also developed to apply to this list to establish which features are considered of greatest importance in Scotland. During stage 4, information to support the application of the criteria was gathered on each of the features on the long list and compiled in a series of spreadsheets. Much of this information was extracted from the UK Biodiversity Action Plan (BAP) assessments, with some refinement to take account of the different geographic scope of the two exercises. The criteria were then tested on a subset of the features, refined and applied to the long list.

Six criteria were used: Proportional Importance (national/regional/global); Decline/Threat of Decline; Functional Importance; Rarity; Data Deficiency; International Commitment. The first three of these were used together to determine if a feature was to remain on the list of Priority Marine Features and to produce a provisional short list of features. The list was refined during an iterative process involving Scottish Natural Heritage (SNH) internal workshops and discussions. A grouping exercise was then carried out on those features that were to remain on the list in order to arrange similar features together, for example inshore burrowed mud habitat types and the species associated with these habitats such as the tall seapen and the fireworks anemone. Following the grouping exercise, a final filtering of the list involved removing overlapping or duplicate habitat types and a number of species which were represented by specific habitats.

The recommended list of 56 Priority Marine Features contains 82 individual features, comprising 36 habitats and 46 species. These are arranged into eight habitat and species groups (covering 25 habitats and 9 species), 11 individual habitats and 37 individual species. Many of the habitats and species which are highly characteristic of the Scottish marine environment, such as horse mussel beds, northern sea fan communities and cold-water coral reefs, are represented on the list. The entries on the list cover a representative range of marine habitats and species from the intertidal to deeper waters away from the coast, from lagoon stoneworts to large cetaceans.

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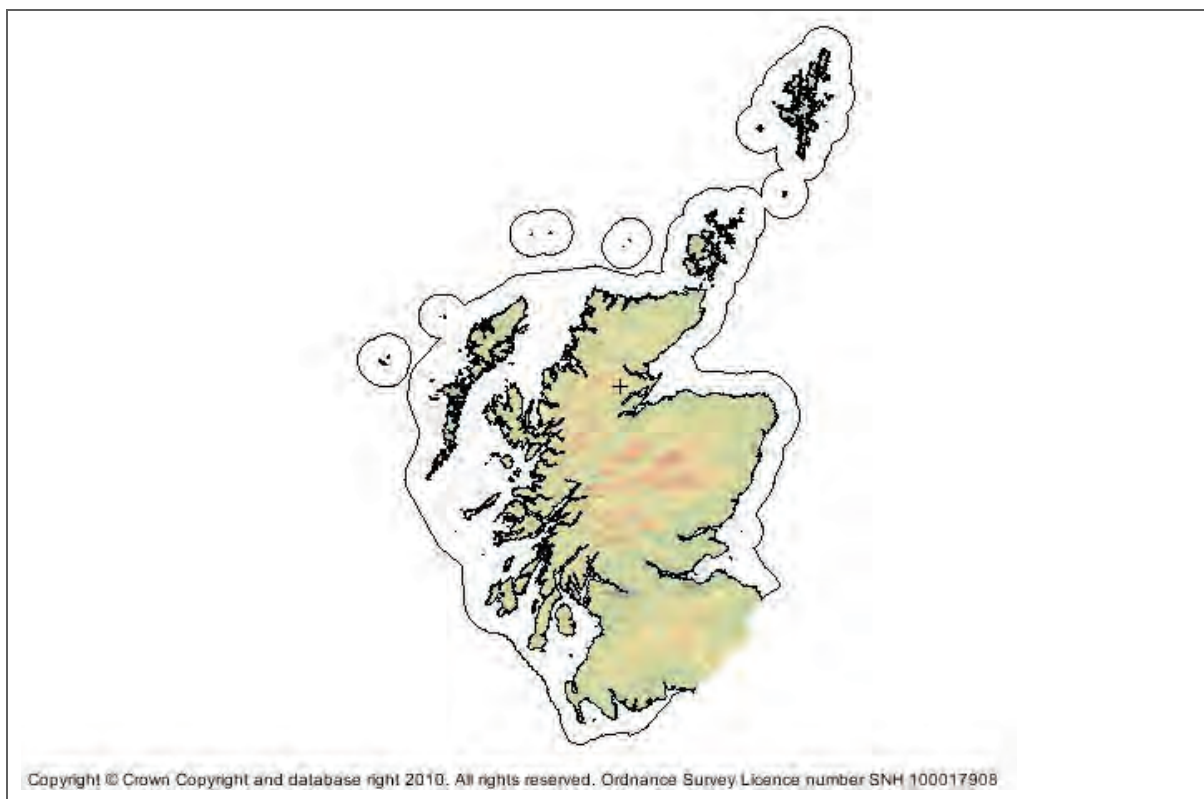
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## 1 INTRODUCTION

There are a number of statutory requirements and policy initiatives of relevance to the conservation and management of the Scottish marine environment and its biodiversity. Amongst these statutory and policy drivers are OSPAR<sup>1</sup>, the Habitats and Birds Directives<sup>2</sup>, the Marine Strategy Framework Directive<sup>3</sup>, the UK and Scottish Marine Acts<sup>4</sup>, the Scottish Biodiversity Strategy (SBS)<sup>5</sup> and the Marine Biodiversity Implementation Plan (MBIP)<sup>6</sup>. Some of these list features, species and habitats at a variety of scales, considered to be of importance to marine conservation and the functioning of marine ecosystems. As the number of marine conservation initiatives has expanded, so the number of species and habitats listed as being of conservation importance has grown. For practical conservation purposes, it became necessary for Scottish Natural Heritage (SNH) to rationalise the various lists by establishing which of the features are present in Scottish waters within the 12 nautical mile limit (the area over which SNH is the statutory nature conservation adviser – see figure 1) and subsequently assigning levels of priority to these features.

*Figure 1: Map showing the limit of Scottish territorial waters*



<sup>1</sup> OSPAR Commission for the protection of the marine environment of the North-East Atlantic. More information at: <http://www.ospar.org/>

<sup>2</sup> Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora and Council Directive 2009/147/EC of 30 November 2009 on the conservation of wild birds (codified version), enacted in Scotland through The Conservation (Natural Habitats, etc) Regulations 1994 (as amended, 2004) information at: <http://www.scotland.gov.uk/library3/nature/habd-00.asp>

<sup>3</sup> Marine Strategy Framework Directive information at: [http://ec.europa.eu/environment/water/marine/index\\_en.htm](http://ec.europa.eu/environment/water/marine/index_en.htm)

<sup>4</sup> Scottish Marine Act at: [http://www.oqps.gov.uk/legislation/acts/acts2010/pdf/asp\\_20100005\\_en.pdf](http://www.oqps.gov.uk/legislation/acts/acts2010/pdf/asp_20100005_en.pdf)  
UK Marine and Coastal Access Act at: [http://www.opsi.gov.uk/acts/acts2009/ukpga\\_20090023\\_en\\_1](http://www.opsi.gov.uk/acts/acts2009/ukpga_20090023_en_1)

<sup>5</sup> Scottish Biodiversity Strategy information at: <http://www.biodiversityscotland.gov.uk/pageType1.php?id=2&type=1&navID=27>

<sup>6</sup> Marine Biodiversity Implementation Plan at: <http://www.biodiversityscotland.gov.uk/library/Marine%20IP.pdf>



The development of a list of priority marine species and habitats forms part of a broader project, the aims of which are to identify:

- a) features of marine nature conservation importance for which it would be appropriate to use area-based mechanisms such as Marine Planning or Marine Protected Areas to achieve better protection;
- b) features of marine nature conservation importance for which non-area based mechanisms would be appropriate;
- c) features of functional importance to Scotland's seas, with the expectation that these features will be at a landscape-scale, i.e. not individual habitats or species.

The project to date has been developed in four phases, with this report dealing with Stage 4, the aim of which was to identify a short list of priority marine habitats and species of marine nature conservation importance for which it would be appropriate to use both area-based and non area-based mechanisms to achieve better protection, thus fulfilling a) and b) above. It is intended that the list will be used as a basis for focusing marine conservation action in Scottish territorial waters.

Ultimately it is proposed that the features identified through this process will be combined with species and habitats identified in offshore waters to form a recommended list of priority features of conservation importance across Scotland's seas.

## 1.1 Background

The first three stages of this project covered the initial compilation of a long list of features from existing conservation mechanisms, the streamlining of this list to ensure that only those features occurring within Scottish territorial waters (within 12 nm) remained on the list and the development of criteria for assessing their importance. These stages are summarised below.

### Stage 1

Lists of important marine species, habitats and landscape-scale units (e.g. sea lochs, lagoons) derived from existing conservation mechanisms (e.g. Natura, Wildlife and Countryside Act 1981, UKBAP, SBS, OSPAR) were amalgamated by SNH to create a list of marine features which are considered important in UK and EC/OSPAR contexts. In addition to features with statutory protection, the list included marine features considered important but not given legal protection under existing conservation mechanisms, such as those included in the WWF Marine Health Check reports "flagship" species and habitats (Hiscock *et al.* 2005, Wilding *et al.* 2009). The resultant list consisted of 554 species and 173 assigned habitat types. Appendix 1 details the original sources of the features included at this stage.

Habitat types were listed as they were on the original list from which they were taken. This included habitat types at a variety of different scales from landscape-scale units to biotope code. The original format of these habitat listings was kept throughout stages one, two, three and most of four, until the grouping exercise. This meant that there was considerable overlap and replication in these early stages with some kinds of habitat represented on the list more than once but at different scales. For example, the horse mussel bed biotope '*Modiolus modiolus* beds with *Chlamys varia*, sponges, hydroids and bryozoans on slightly tide-swept very sheltered circalittoral mixed substrata' (SS.SBR.SMus.ModCvar) was listed, as was 'horse mussel beds' which encompasses the SS.SBR.SMus.ModCvar biotope along with other horse mussel bed biotopes. It was decided that all habitats should remain listed in their original format until a decision could be made about the scale at which they were considered important; for example, whether it was the biotope SS.SBR.SMus.ModCvar that was

important or whether it was all biotopes that could be encompassed by the habitat 'horse mussel beds'.

It should be noted that the only species and habitat types included were ones that had been listed previously on at least one of the lists in Appendix 1; there was no intention of identifying any additional species or habitats within the initial process. However, any that were raised incidentally have been recorded and will be considered when the list is reviewed.

## **Stage 2**

The amalgamated list was screened by the National Museums of Scotland (NMS), in consultation with a number of taxonomic experts, to remove any features not occurring in Scottish waters. The resultant long list of important Scottish marine features contained 324 species and 151 assigned habitat types (Appendix 2), although many of these are overlapping. Each habitat type was assigned to one of eight landscape-scale units and 73 community types to aid the review process.

## **Stage 3**

A set of importance criteria were developed for subsequent application to the Stage 2 list to identify features of most importance in Scottish waters. As a great deal of work on importance criteria had already been done by the various UK conservation agencies, criteria already in use were reviewed for their applicability to this project. A discussion document explored the options for suitable criteria (Howson, 2008 unpub.). An internal SNH workshop was then held to discuss and agree the criteria which should be applied to the features on the list in order to meet the overall aims of the project. The approach of using existing criteria was considered to be practical since the existing criteria were considered fit for purpose. In addition it meant that the results of previous applications could simply be checked to ensure the data reflected current knowledge and for relevance to Scottish territorial waters.

### **1.2 Objectives of Stage 4 - application of criteria**

The stage of the project reported here tested and refined the set of criteria developed as part of stage 3 and then assessed the features remaining on the list against these criteria. The output of this process was intended to be a robust but concise list of features of conservation importance within Scottish territorial waters, covering a range of scales and levels of organisation from species to landscape-scale unit. The aim was to produce a list which could be used to focus marine conservation action in Scottish territorial waters.

The assessments made against the criteria reflect best judgement based on the information available. For some features this information was more robust than others. Previous UK BAP assessments were used where they existed with any more recent information. For some features, as more information becomes available, assessments may change. The list is expected to be updated, taking new data into account to improve the priorities but no formal review process has yet been established.

## 2 CRITERIA DEVELOPMENT AND PROPOSED METHODOLOGY

The criteria developed in Stage 3 of the project fell into three categories:

- initial screening (pragmatic criteria);
- importance criteria; and
- management criteria.

It was envisaged at the start of the project that the list of features would be filtered by each set of criteria in turn, with the management criteria applied only to those features which passed the importance criteria. This section of the report outlines the methodology proposed at the outset for the application of the criteria. During the course of this exercise, it became clear that changes to this approach were needed and these are detailed in Section 3.

### 2.1 Initial screening

There were no detailed criteria developed at this stage, but experience gained whilst producing the features lists contributed to some editing of the list, to remove features which it was clear from the outset would not be of priority for any protective conservation action by SNH. For example, wireweed *Sargassum muticum*, an alien species of algae which is currently spreading in Scotland, was on the initial long list of features, due to its inclusion within the Species Action Framework. Clearly, SNH would not consider action to enhance the populations of this species, and thus it was removed from the list at this stage. Similarly, other non-native species, species known to be vagrants and dubious records were removed.

### 2.2 Importance criteria

Importance criteria were developed during summer 2008 and were refined following an internal SNH workshop in autumn 2008. They were based primarily on the criteria used for the Nationally Important Marine Features list (NIMF) (Hiscock *et al.*, 2006) and the Biodiversity Action Plan (BAP) (Vincent *et al.*, 2004 and UK Biodiversity Action Plan website) assessments and covered six areas:

1. Proportional Importance
2. Decline/Threat of Decline
3. Functional Importance
4. Rarity
5. Data Deficiency
6. International Commitment

Table 1 lists these and outlines the initial thresholds that were used for their testing and application and Section 4.1 explains how it was decided whether a feature passed the criteria and therefore remained on the recommended list. This table shows the starting position for the process. A number of changes were made at a later date. These are discussed in Section 3.3.

The workshop agreed that the first three criteria should be given the most weight when assessing whether features should remain on the list or be removed with Rarity, Data Deficiency and International Commitment providing supporting information.

### 2.3 Management criteria

It was planned that those features which were considered important after the application of the importance criteria should then be subject to a grouping exercise (combining related features where appropriate) before assessing the features against a set of management criteria to filter the list further. The management criteria were designed to assess whether

adequate knowledge of the issues was available and whether targeted action could be effective in the conservation / management of the feature. Like the importance criteria, they were developed from existing criteria, largely those used by SNH to underpin its Species Action Framework.

Four management criteria were to be considered:

1. Is there sufficient knowledge of the feature (ecology, requirements etc.) to inform management action?
2. Can effective management actions be identified?
3. Would the targeted action raise awareness of biodiversity issues more broadly?
4. Is the feature of socio-economic importance and does its exploitation impact upon biodiversity?

**Table 1** *Original Importance Criteria for the selection of Scottish marine features of conservation importance with notes for initial testing. Note that changes were made to these criteria at a subsequent stage of the project; see Section 3.3.*

Importance criteria	Details
<p><b>Is the feature proportionally important?</b></p> <p>i.e. does a high proportion of it occur within Scotland?</p> <p>This can be in a UK, regional or global context.</p>	<p><b>NIMF/BAP thresholds:</b></p> <p><u>Globally important:</u> more than 20% of the global extent of a marine habitat or of the global population of a species (at some stage in its life cycle) occurs within the UK.</p> <p><u>Regionally important:</u> more than 30% of the regional extent of a marine habitat, or of the regional population of a species (at some stage in its life cycle) occurs within the UK. 'Regional' refers to the North-East Atlantic (OSPAR) area.</p> <p><b>Note:</b></p> <p>A species/habitat will be proportionally important if more than a certain amount of the UK population or habitat occurs in Scotland. This should be trialled using different percentages or by eye using distribution maps.</p>
<p><b>Is the feature in decline or under threat of decline?</b> (see table )</p>	<p><b>NIMF/BAP thresholds:</b></p> <p>There is an observed, estimated, inferred or suspected significant decline (exceeding expected or known natural fluctuations) in numbers, extent or quality of a marine habitat or a species in Scotland (for species, quality refers to life history parameters). The decline may be historic, recent or current. Alternatively, a decline at a UK global or regional level, where there is cause for concern that the Proportional Importance criterion will be met within the foreseeable future.</p> <p>Or it is estimated, inferred or suspected that a species or habitat will suffer significant decline in the foreseeable future as a result of human activity. This assessment will need to take into account inherent sensitivity, and expected degree of exposure to the effects of human activity. A species or habitat may also qualify under this criterion if there is real cause for concern that it would fulfill the Proportional Importance criterion in the near future due to the threat of global or regional decline.</p> <p>If the feature passes under these criteria in the NIMF or OSPAR assessments then it will need assessing to see if the issues apply in Scotland. For those that were not assessed for NIMF, significant decline should be assessed as 25% reduction of area or numbers, or other appropriate threshold (which must be stated and justified).</p>

Importance criteria	Details
<p><b>Is the feature functionally important?</b></p>	<ul style="list-style-type: none"> <li>➤ Features which may be functionally critical (i.e. areas that are part of a wider ecosystem but provide reproductive or feeding areas for particular species).</li> <li>➤ Habitats which are important for priority species.</li> <li>➤ Habitats which may be formed from a keystone species - one which hosts a characteristic community of other species.</li> </ul> <p>The formal definition of functional importance used previously has yet to be clarified. However the definition used for OSPAR is below.</p> <p>Ecological significance: the habitat is very important for the wider significance of the ecological processes functions and species that it supports. The ecological functions within the habitat support species and ecosystem processes over a much wider area. Example habitats could be: spawning, breeding, reproduction or nursery areas, resting and feeding areas, areas with high natural productivity or diversity, areas with a high proportion of endemic species and areas important as migratory routes.</p> <p>Note: At this stage no consideration had been given to the functional significance of species.</p>
<p><b>Is the feature rare in Scotland?</b></p>	<p>Marine habitats and species that are sessile or of restricted mobility (at any time in their life cycle) are considered nationally rare if their distribution is restricted to a limited number of locations.</p> <p>Rarity has been assessed in the UK as follows:</p> <ul style="list-style-type: none"> <li>➤ The feature occurs in less than 0.5% of the total number of 10 km x 10 km squares in UK waters.</li> <li>➤ A mobile species qualifies as nationally rare if the total population size is known, inferred or suspected to be fewer than 250 mature individuals.</li> </ul> <p>Vagrant species should not be considered under this criterion.</p> <p>This information should be collected where it is available (from BAP/NIMF/SBL assessments etc) but should not be used as a pass/fail criterion for features.</p>
<p><b>Is the feature data deficient?</b></p>	<p>This information should be collected alongside the other information but should not be used as a primary criterion on which features can pass or fail. However, where a feature is considered so data deficient that it cannot be assessed against the other criteria, the feature will not pass. This information should still be available to inform management, as well as potential future review.</p>
<p><b>Is there an international commitment?</b></p>	<p>If there is an international commitment i.e. the feature is listed by OSPAR, the EU Habitats and Birds Directives, Ramsar<sup>7</sup>, Bern Convention<sup>8</sup>, Bonn Convention<sup>9</sup>, CITES<sup>10</sup> or IUCN<sup>11</sup>. This information should be collected and considered alongside the other information. It should not be used as a criterion on which features can pass or fail.</p>

<sup>7</sup> The Ramsar Convention on Wetlands of International Importance, information at: [http://www.ramsar.org/cda/en/ramsar-home/main/ramsar/1%5e7715\\_4000\\_0\\_\\_](http://www.ramsar.org/cda/en/ramsar-home/main/ramsar/1%5e7715_4000_0__)

<sup>8</sup> The Bern Convention on the conservation of European wildlife and natural habitats, information at: [http://europa.eu/legislation\\_summaries/environment/nature\\_and\\_biodiversity/l28050\\_en.htm](http://europa.eu/legislation_summaries/environment/nature_and_biodiversity/l28050_en.htm)

<sup>9</sup> The Bonn Convention on the Conservation of Migratory Species of Wild Animals, information at: [http://www.unep-wcmc.org/conventions/harmonization/products/CMS\\_InformationPaper.pdf](http://www.unep-wcmc.org/conventions/harmonization/products/CMS_InformationPaper.pdf)

<sup>10</sup> CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) information at: <http://www.defra.gov.uk/animalhealth/cites/legislation.htm>

<sup>11</sup> IUCN, the International Union for Conservation of Nature information at: <http://www.iucn.org/>

### 3 APPLICATION OF CRITERIA

#### 3.1 Data gathering and spreadsheets

A large number of the species and habitats on the long list had been assessed as part of the BAP and NIMF assessments. The data used for these were made available for this project and were incorporated into the spreadsheets produced for the SNH assessment. This considerably reduced the amount of data searching and collation that had to be carried out.

An Excel workbook was set up for each Phylum or species group and for four main habitat groups (Appendix 3). Each workbook contained the following worksheets:

1. **Codes:** explanation of the codes used under each assessment, which were added later in the process;
2. **Criteria summary:** a summary of the assessments made under each of the criteria and whether the features pass or fail;
3. **Proportional Importance:** the detail of the information gathered and the assessment process for each feature for this criteria;
4. **Decline/ Threat of Decline:** the detail of the information gathered and the assessment process for each feature for this criteria;
5. **Functional Importance:** the detail of the information gathered and the assessment process for each feature for this criteria;
6. **Rarity:** the detail of the information gathered and the assessment process for each feature for this criteria;
7. **Data Deficiency:** the detail of the information gathered and the assessment process for each feature for this criteria;

Any relevant information available from the BAP/NIMF assessments was copied into the spreadsheets and additional columns were created for the SNH assessment. The largest area where additional information was required was in assessing Proportional Importance and Rarity. Information on the Scottish distribution of species and habitats was gathered primarily from online databases, with some information from specialists in particular fields, who provided comments on the list at various stages as well as copies of relevant publications. In addition, some information that had been gathered from specialists for the compilation of the Scottish Biodiversity List (SBL) was available and still reflected current knowledge. Table 2 lists the main sources of information. Other publications and on line sources of information are listed in the bibliography (Section 7). Specialists who were consulted for the production of the Scottish long list were only consulted again at this stage when it proved difficult to find information from literature and publicly available databases.

**Table 2** *Main information sources and specialists consulted to support application of the importance criteria*

Group Name	Information sources	Consultees
Coastal habitats	<u>JNCC Marine Habitat Classification</u> ; <u>MarLIN</u> ; <u>UK Marine SACs Project</u> ; <u>UK BAP</u>	Personal knowledge (CMH)
Deep sea habitats	<u>JNCC Marine Habitat Classification</u> ; <u>MarLIN</u> ;	J. Hall-Spencer, Plymouth Marine Laboratory
All species groups	<u>NBN Database</u> ; <u>MarLIN</u> ; <u>MarBEF</u> ; <u>Encyclopedia of Marine Life of Britain and Ireland</u> ; <u>Arkive</u> ; <u>ZipCodeZoo</u> ; relevant Linnean Society Synopses	Personal knowledge (CMH)
Plants other than algae	SNH Website	N. Stewart, Consultant
Algae	<u>Algaebase</u>	C. Maggs, Queens University Belfast; J. Hall-Spencer, PML



Cnidaria		C. Greathead, Marine Scotland Science
Bryozoa		P. Hayward (for Scottish Biodiversity List)
Crustacea		Personal knowledge (CMH)
Echinodermata		Personal knowledge (CMH)
Fish	<a href="#">FishBase</a>	Marine Scotland Science
Mammals & Turtles	<a href="#">OBIS Seemap</a>	J. Herman, National Museums of Scotland
Minor phyla		Personal knowledge (CMH)
Mollusca		J. Nunn, Ulster Museum
Nemertea		R. Gibson (for Scottish Biodiversity List)
Porifera	<a href="#">World Porifera Database</a>	Personal knowledge (CMH)
Tunicata		Personal knowledge (CMH)

### 3.2 Initial testing

The importance criteria and a set of management criteria were tested on the species and habitats listed in Table 3. These species and habitats were chosen in part due to the author's familiarity with them and in part because there was accessible information which allowed the criteria to be tested with relative ease.

**Table 3** Test habitats and species

Species	
<i>Swiftia pallida</i>	Northern sea fan
<i>Thia scutellata</i>	Thumbnail crab
<i>Psolus phantapus</i>	Sea cucumber
<i>Antedon petasus</i>	Feather star
<i>Aglaothamnion priceanum</i>	Red alga
<i>Lithothamnion glaciale</i>	Maerl
<i>Dipturus batis</i>	Common skate
Habitats	
SS.SMx.IMx.Lim	<i>Limaria hians</i> beds in tide-swept sublittoral muddy mixed sediment
SS.SMx.IMx.Ost	<i>Ostrea edulis</i> beds on shallow sublittoral muddy mixed sediment
CR.LCR.BrAs.NeoPro	<i>Neocrania anomala</i> and <i>Protanthea simplex</i> on sheltered circalittoral rock
SS.SMx.CMx.CIoMx.Nem	<i>Cerianthus lloydii</i> with <i>Nemertesia</i> spp. and other hydroids in circalittoral muddy mixed sediment

It was possible to apply the importance criteria with meaningful results although it was clear at this early stage that thresholds needed to be set for Proportional Importance and Rarity. In addition, very little robust information was available for Decline/Threat of Decline. Functional Importance was vague and needed clearer categorisation. It also proved difficult to apply the management criteria without firm examples of feasible management actions.

These issues were addressed in the subsequent stages of the exercise, discussed in section 3.3.

### 3.3 Refining the criteria

With the collection of more data for a greater number of species and habitats, the definitions of each of the criteria were refined. Each criterion was divided into a number of categories to help clarify the assessment. In some cases, such as Proportional Importance, these categories were ranked and therefore mutually exclusive whilst in others, such as Functional Importance, more than one category could apply. Codes were allocated to the categories in the spreadsheets to assist in the assessment of pass and fail and these are described in the tables below.

#### 3.3.1 Proportional Importance

Proportional Importance was categorised as per Table 4 below. These codes refer to the Proportional Importance in Scottish territorial waters, i.e. within the 12nm limit (Figure 1). If Scottish offshore populations were thought to be more important than the inshore populations, this reduced the Proportional Importance score, which dropped to 0 if the inshore populations were not considered at all important.

Highly mobile species such as fish were treated slightly differently as it was considered appropriate to take into account different stages of some species' life history. If Scottish waters are considered important for a certain part of a species life history, such as spawning, yet not for the remainder of the species life, the assessment was applied to this life history stage.

**Table 4** Proportional Importance categories

Category	Spreadsheet Code	Comment
Not proportionally important	0	Scottish populations not considered proportionally important in a national, regional or global context, i.e. they do not meet any of the categories below.
National	1	Nationally important if Scotland has 20% or more of UK 10km square occurrences. Species data generally good
Regional	2	Informed assessment mostly based on distribution maps. If 30% or more of records from the region are in Scotland then Scottish populations were considered to be of regional importance. This was often difficult to assess, particularly for habitats. Regional was considered to be North-East Atlantic/Europe
Global	3	Usually difficult to assess, particularly for habitats, where very little information was available. If 20% or more of available records globally are in Scotland then Scottish populations were considered to be of global importance

#### 3.3.2 Decline / Threat of Decline

Information for this criterion was taken from the BAP assessment for most species and habitats. The MarLIN website also proved useful and a number of experts provided information, particularly for the fish. Where climate change and/or other anthropogenic factors were considered to be the main cause of decline or threat, these were highlighted within separate decline categories. Climate change was separated out because it was felt that, in the immediate term, it was unlikely there would be practical conservation actions that could be taken to mitigate the probable overriding effects of climate change. Features for which climate change was considered the major threat were left off the recommended priority list (see Appendix 4).

The severe decline category was determined from the BAP assessment.

**Table 5** *Decline/Threat of Decline categories*

Category	Spreadsheet Code	Comment
Insufficient data	A	
No decline/threat in Scotland	B	
Climate change	C	Climate change alone has not been used as a Pass/Fail criterion
Anthropogenic	D	
Climate change and anthropogenic	E	
Severe decline	F	
Environmental decline	G	Decline due to environmental causes other than climate change; cause not necessarily known

### 3.3.3 Functional Importance

The initial definitions of Functional Importance were difficult to apply, partly because of problems in deciding which species should be classed as functionally important species. For example, some may be classed as keystone species which are consumers and others as ecosystem engineers which are usually habitat formers/providers. In addition, the selection of habitats important for priority species created a circular argument, as the present exercise is designed to select the priority species. A number of simpler categories for which information was generally available were therefore selected. The greater the number of these categories which applied to a species or habitat, the more weight was given to Functional Importance. Even with these simplified categories, information was not always available and this is an area where data deficiency is an issue. Some of the gaps in the data would certainly be filled with more detailed literature searches and wider consultation with experts, but the level of research required was beyond the scope of this particular project.

**Table 6** *Functional Importance categories*

Species	Habitat	Spreadsheet Code	Comment
Increases diversity	High diversity	A	
Provides shelter	Provides shelter	B	
Host	Known as important for reproduction/development stages	C	This information is not known for many habitats.
Creates structure	Complex structure	D	
Dominant predator/grazer	Supports important food species	E	
Key food species		F	
No known functional importance	No known functional importance	G	

### 3.3.4 Rarity

Rarity was assessed in terms of the number of 10 km squares in which a species or habitat has been recorded. The following categories were used:

Rare in Scotland	6 or fewer 10 km squares
Scarce	7 - 55
Uncommon	56 - 150

Common	151 - 500
Widespread	>500

The definition of what constitutes rare in Scotland is the same as that used in the Scottish Biodiversity List, whilst the other categories follow the UK codings more closely. Information was not always available in terms of 10 km squares, particularly in the case of non-coastal species and habitats where ICES rectangles were more appropriate. In general, information for these was sparser than for inshore species and habitats. In some cases it was not possible to assign a Rarity category, due to a lack of available information. For some non-coastal features, it was difficult to sort out which records occurred within the 12 nm limit relevant to this project and which fell outside the limit.

### 3.3.5 *Data Deficiency*

The level of data deficiency was an informed assessment based on the ease with which information about the feature could be found and applied to the other importance criteria.

### 3.3.6 *International Commitment*

There is an international commitment if the feature is listed by OSPAR, the EU Habitats Directive, Ramsar, Bern Convention, Bonn Convention, CITES or IUCN.

## 4 ASSESSMENT OF PASS AND FAIL

### 4.1 Provisional assessment of pass/fail

The three criteria which contributed to a pass or fail were Proportional Importance, Decline/Threat of Decline and Functional Importance. The minimum requirement to pass was if the feature was nationally important or greater (Code 1, 2 or 3) plus either Decline/Threat of Decline (Code D, E or F) or some aspect of Functional Importance (Code A, B, C, D, E or F).

The majority of features failed the assessment; in most cases this was because they were not proportionally important. Species or habitats for which there was very little or no information available failed due to data deficiency; these features were included on a separate list (Appendix 5) and may be reassessed in future. Features that were known to have declined and were functionally important were considered for a provisional pass but it was felt that, to merit inclusion on a Scottish priority list, they should be at least of national importance in Scotland (code 1, Table 4). The clearest passes were those species which were definitely of regional or global importance (Codes 2 and 3 respectively).

Despite the Data Deficiency criterion, it was accepted that the level of information available throughout the project was often patchy or poor. In some instances it was considered possible to make a reasoned judgement based on incomplete information combined with expert knowledge, rather than simply fail a feature outright. At this assessment stage, a number of features were ranked as possible passes and were highlighted for further consideration. These were generally features which were of national importance, rather than regional or global, and where there was some evidence that they were either declined (including under threat of decline) or functionally important, but where the data were incomplete. These borderline passes were flagged for further discussion with SNH marine staff.

This provisional assessment reduced the list to approximately 60 species and 36 habitats.

### 4.2 Grouping exercise, combining related features

Individual features which passed the initial pass/fail assessment were then combined into groups, where appropriate. For example, the seafan *Swiftia pallida*, all the habitat types representing seafan communities and the biotope CR.HCR.DpSp (deep sponge communities) were grouped into *Northern seafan and sponge communities*. The following groups resulted:

- Blue mussel beds
- Burrowed mud
- Horse mussel beds
- Low or variable salinity habitats
- Native oysters
- Northern sea fan and sponge communities
- Seagrass beds
- Tide-swept algal communities

Features which did not readily fit into a group, or where it was felt that grouping was not appropriate, were listed as separate habitats or species. Two potential groups were *Dolphins* and *Commercial fish* but it was felt that it was important to list these species individually, as potential conservation actions were likely to be species-specific. It is emphasised that

features included in the groups had all passed the assessment in their own right and that the groups were not expanded to include any borderline or failed features.

### 4.3 Discussion of the list at an internal SNH workshop

At this stage, the list was presented to an internal SNH workshop attended by many of the marine staff. There were useful discussions around a number of issues, resulting in further filtering of the list.

- Threat of Decline - One point to emerge from the workshop was that one of the major factors causing Threat of Decline was climate change. It was felt that climate change effects should be considered alongside natural change, as SNH were unable to mitigate against them. Potentially management to support species adaptation to climate change could be put in place although it was felt there was not yet enough information to develop this and it was beyond the scope of this project. For future revisions of the list adaptation to climate change could be a consideration. As a result of this discussion, any features which were being considered as a pass but where the main threat was thought to be climate change were placed on a separate list (Appendix 4).
- Landscape-scale units such as *Sea lochs* and *Sounds* were considered: was it appropriate to apply criteria to this scale of feature? It was agreed that the application of subsequent management actions might be appropriate at this scale but that the criteria themselves should not be applied to these larger units. The assessment of these features was not developed any further during this project, but will be taken forward separately.
- The results of a discussion of Functional Importance were incorporated into the revised *Functional Importance categories* in Section 3.3.3.
- The Scottish perspective was emphasised in a number of areas. For example, several fish species, such as mackerel, were thought to be of higher Proportional Importance than the spreadsheet data indicated, as they are seasonally important in Scottish seas. Following the workshop, further input was sought from fisheries specialists in Marine Scotland Science and JNCC. A second example is the European sea urchin *Echinus esculentus*. This was listed as threatened by the BAP assessment, but is abundant in Scottish waters and not considered to be under any threat; it was therefore removed.
- The workshop and subsequent discussions resolved issues with a number of borderline features. Species which were particularly rare or data deficient were removed as were the very broad, all encompassing habitats such as *Sublittoral mixed sediments*. It was agreed that data deficient features should be compiled into a separate list (Appendix 5) with potential to review their inclusion as and when new data become available.

### 4.4 Application of management criteria

The workshop discussions concluded that, for a feature to pass the management criteria, an effective and feasible management action should be identified. Possible management approaches that were considered covered the full spectrum from strict protection to raising awareness:

- protection from all activities;
- protection from specific activities;
- restriction of activities (licensing/ consents etc.)
- influencing activities (e.g. codes of conduct, codes of good practice, planning process).



These could be applied using a number of management actions, such as:

- designate an area or species;
- zoning, spatial planning, mapping;
- temporal controls;
- controls of specific activities;
- restoration or management intervention such as translocation of species/habitats;
- research and monitoring;
- inform and educate.

Following this discussion, the management criteria were applied to the provisional pass list; a feature would pass at this stage if an effective management action such as one of those listed above could be identified. It rapidly became apparent that a number of actions at the level of detail considered above were applicable to all the features. These included the whole spectrum from exclusion zones to awareness raising, research and monitoring. In order to use the management criteria as an effective filter, specific actions would need to be identified. It was felt that this was not practical at this stage of the project. This is an area that would be addressed once the short list was confirmed and so the application of the management criteria was abandoned.

#### **4.5 Final grouping and rationalisation of the list**

Following the final grouping, the list was reassessed and refined further. Duplicate or overlapping habitats, which had come through from the original starting lists, were removed (see Section 1.1). The following species were also removed:

Sea loch egg wrack	<i>Ascophyllum nodosum</i> ecad. <i>mackaii</i>
Eelgrass	<i>Zostera marina</i>
Flame shell	<i>Limaria hians</i>
Maerl	<i>Lithothamnion glaciale</i>
Maerl	<i>Phymatolithon calcareum</i>
Horse mussel	<i>Modiolus modiolus</i>

The primary habitat for each of these species is listed as a feature in its own right and in these cases it was felt that the main biodiversity interest was in protecting the habitat. However, the native oyster *Ostrea edulis* and the northern sea fan *Swiftia palida* were exceptions; it was considered important to protect these features both as species and as part of the habitat.

The recommended list of 56 Priority Marine Features, summarised in Table 7 and given in full in Appendix 6, contains 82 component features, comprising 36 habitats and 46 species. These are arranged into eight habitat and species groups (covering 25 habitats and 9 species), 11 individual habitats and 37 individual species.

## 5 DISCUSSION

The recommended list is felt to be a good representation of species and habitats that require conservation action in Scottish waters, for which sufficient information is available to make an assessment. It is also felt to include many of the features which are considered to characterise the Scottish marine environment. However, it is clear that there are large gaps in our knowledge and that as more information becomes available, it may be necessary to add other species or habitats to the list of Priority Marine Features in future. The haddock, *Melanogrammus aeglefinus*, for example, may merit inclusion; however it has not been assessed in the current process as it was not on any of the original lists of species of conservation importance. It was decided that assessment of further habitats and species, such as haddock, should be kept for a future revision.

During this exercise, Proportional Importance was the first criterion that was used to select features that might pass. It was clear from the outset that this was fundamental to the exercise: a species or habitat had to be known to have at least national importance in Scottish terms to rank it as a priority for conservation action. Rarity, on the other hand, was not considered a qualifying criterion as in many cases this is an artefact of survey effort. Most rare species which came through the initial pass/fail assessment were removed following the SNH workshop (Section 4.3). However, a few rare or scarce species were retained. For example, these include the pink soft coral *Alcyonium hibernicum* which appears to be confined to Britain and for which most records are Scottish. The Scottish populations can be considered of global importance and it is a species which is found in the semi-exposed rocky habitats around islands and the entrances to sea lochs which are highly representative of Scottish waters. Another example of a rare feature which has been retained on the list is the fan mussel *Atrina fragilis*. The majority of recent British records of this species are from Scottish waters. This fragile species was once relatively common but its populations have been severely depleted and it is now considered to be one of the most endangered molluscs in UK waters.

Highly mobile species such as fish were treated slightly differently as it was considered appropriate to take into account different stages of some species' life history. For example, the Atlantic herring *Clupea harengus* relies on inshore gravel areas with water flow for spawning. Although the species spends much of its life offshore, it has been ranked as nationally important in inshore Scottish waters on the basis of these spawning grounds.

Decline/Threat of Decline was the second major criterion for the assessment of pass and fail, although there were large gaps in the information available in this area. The majority of information for this criterion was taken from the BAP assessment and if any decline or a threat was known, or could be inferred, the feature passed. Two major factors emerged: the effects of climate change and the effects of fishing activities.

Discussions took place at some of the workshops as to whether assessments should reflect the historical as well as, or instead of, current importance of a species. For example, a species may have been proportionally or functionally important at one time, but is no longer, due to a massive decline in numbers. The blue fin tuna would fall into this category, but it is considered very unlikely to return to Scottish waters and so has not merited inclusion on the list. In contrast, the native oyster *Ostrea edulis* has declined dramatically due to a combination of factors including over-collection and water quality, but this species has restoration potential and so has been included. These sorts of judgements have been made on an individual basis, taking into account the wider knowledge of the species concerned.

There are some features for which there is International Commitment, which have not passed the criteria and are therefore not on the Priority Marine Features list. For example, the dog whelk *Nucella lapillus*, which is on the OSPAR Threatened and Declining list, has

not been prioritised. Scottish populations may be considered important, but populations in Scotland are not considered to be in decline or under threat of decline, unlike elsewhere in the UK and North-East Atlantic, so it did not pass the criteria.

As noted earlier the initial working list had been generated from a compilation of all the habitats and species found on the various conservation registers that apply to Scottish waters; no attempt was made to identify gaps or additional features that could be included. The recommended list therefore reflects these origins and some comments on particular groups and issues are highlighted below.

## **5.1 Habitats**

The project took as its starting point those habitats and species which had already been listed as being of conservation importance. However, if the starting point for the present work had been a complete list of Scottish biotopes, a number of additional biotopes may well have passed the criteria. This should be an area for future consideration.

Habitats, and the biotopes which make up these habitats, have been listed at the highest relevant biotope level<sup>12</sup>.

## **5.2 Deep-water habitats**

Deep-water habitats (e.g. over-deepened basins) are a characteristic feature of Scotland's marine environment. This is an area of active research and more species or habitats may merit inclusion on future revisions of the list. Deep-water habitats are also represented on lists dealing with the seas beyond the 12 nm limit.

## **5.3 Algae, crustacea and other invertebrates**

Crustacea may be under-represented on the list. Crustacea that are included originated from the Scottish Biodiversity List, and it is known that the consultation for this group during the Scottish Biodiversity List project was particularly difficult. It is expected that as more information becomes available about particular species in this group, additional priorities may be identified.

## **5.4 Fish**

Fish species form a significant proportion of the recommended list. However, the decisions as to which species to include were not straightforward, particularly in relation to commercial fish species considered to be threatened or to have suffered severe decline. The recommended list took into account decisions made at a joint workshop with scientists from Marine Scotland Science.

## **5.5 Cetaceans**

Data on the population status of several of these species are limited; however cetaceans that have been included are ones that are known to have significant populations and/or large numbers of regular sightings in inshore Scottish waters. Threats and/ or pressures were generally well documented, although there was typically a lack of evidence to link cause and effect (particularly for cetaceans and other highly mobile, largely non-commercial species). For all of the cetacean species there was a degree of expert judgement involved in making assessments.

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<sup>12</sup> Based on The Marine Habitat Classification for Britain and Ireland (Connor *et al.*, 2004)

## 6 CONCLUSIONS

The recommended list is felt to be a good representation of species and habitats that require conservation action in Scottish territorial waters, for which sufficient information is available to make an assessment. It includes many of the features which are considered to characterise the Scottish marine environment, ranging from flame shell beds to the cold-water coral reefs of the deeper seas. The list represents our current knowledge of these habitats and species. As more information becomes available, other features may merit inclusion on future revisions of the list. It is intended that this list will provide a basis for focusing marine conservation initiatives in Scottish territorial waters, with a sub-set of the features on the list being used to underpin the selection of new Marine Protected Areas (as described in the MPA Selection Guidelines<sup>13</sup>).

It is understood that other agencies may already have management strategies in place for some of the features on the list, particularly the fish and mammals. However, this was not considered reason to prevent their inclusion on the list. All the features which have passed the criteria are considered important components of the biodiversity of Scottish seas.

Alongside the current process, JNCC have developed a complementary list of recommended Priority Marine Features in Scottish offshore waters (JNCC, 2012). Ultimately, it is intended that the offshore and the territorial waters lists will be combined into a single recommended list of Priority Marine Features in Scotland's seas. It is anticipated that these recommendations will be subject to public consultation before being considered for formal adoption by Scottish Ministers.

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<sup>13</sup> Marine Protected Areas in Scotland's Seas. Guidelines on the selection of MPAs and development of the MPA network. Published February 2011. Available online at: <http://www.scotland.gov.uk/Topics/marine/marine-environment/mpanetwork/mpaguidelines>

**Table 7** Recommended list of Priority Marine Features in Scottish territorial waters

**(a) habitats**

Priority Marine Feature	Component biotopes/ species (biotope/ common name)	Component biotopes/ species (biotope code/ species name)
<b>Blue mussel beds</b>	<i>Mytilus edulis</i> beds on littoral sediments	LS.LBR.LMus.Myt
	<i>Mytilus edulis</i> and <i>Fabricia sabella</i> in littoral mixed sediment	LS.LSa.St.MytFab
	<i>Mytilus edulis</i> beds on sublittoral sediment	SS.SBR.SMus.MytSS
	<i>Mytilus edulis</i> beds on reduced salinity infralittoral rock	IR.LIR.IFaVS.MytRS
<b>Burrowed mud</b>	Seapens and burrowing megafauna in circalittoral fine mud	SS.SMu.CFiMu.SpnMeg
	Burrowing megafauna and <i>Maxmuelleria lankesteri</i> in circalittoral mud	SS.SMu.CFiMu.MegMax
	Tall seapen	<i>Funiculina quadrangularis</i>
	Fireworks anemone	<i>Pachycerianthus multiplicatus</i>
	Mud burrowing amphipod	<i>Maera loveni</i>
<b>Cold-water coral reefs</b>	<i>Lophelia</i> reefs	SS.SBR.Crl.Lop
<b>Flame shell beds</b>	<i>Limaria hians</i> beds in tide-swept sublittoral muddy mixed sediment	SS.SMx.IMx.Lim
<b>Horse mussel beds</b>	<i>Modiolus modiolus</i> beds with hydroids and red seaweeds on tide-swept circalittoral mixed substrata	SS.SBR.SMus.ModT
	<i>Modiolus modiolus</i> beds on open coast circalittoral mixed sediment	SS.SBR.SMus.ModMx
	<i>Modiolus modiolus</i> beds with fine hydroids and large solitary ascidians on very sheltered circalittoral mixed substrata	SS.SBR.SMus.ModHAS
	<i>Modiolus modiolus</i> beds with <i>Chlamys varia</i> , sponges, hydroids and bryozoans on slightly tide-swept very sheltered circalittoral mixed substrata	SS.SBR.SMus.ModCvar
<b>Inshore deep mud with burrowing heart urchins</b>	<i>Brissopsis lyrifera</i> and <i>Amphiura chiajei</i> in circalittoral mud	SS.SMu.CFiMu.BlyrAchi
<b>Intertidal mudflats</b>	Littoral mud	LS.LMu
<b>Kelp and seaweed communities on sublittoral sediment</b>	Kelp and seaweed communities on sublittoral sediment <sup>14</sup>	SS.SMp.KSwSS
<b>Low or variable salinity habitats</b>	Faunal communities on variable or reduced salinity infralittoral rock	IR.LIR.IFaVS
	Kelp in variable or reduced salinity	IR.LIR.KVS
	Submerged fucoids, green or red seaweeds (low salinity infralittoral rock)	IR.LIR.Lag
	Sublittoral mud in low or reduced salinity (lagoons)	SS.SMu.SMuLS
	Bird's nest stonewort	<i>Tolypella nidifica</i>
	Baltic stonewort	<i>Chara baltica</i>
Foxtail stonewort	<i>Lamprothamnium papulosum</i>	
Small brackish water snail	<i>Hydrobia acuta neglecta</i>	

<sup>14</sup>The following sub-biotopes are specifically excluded: Mats of *Trailiella* on infralittoral muddy gravel (SS.SMp.KSwSS.Tra); & Filamentous green seaweeds on low salinity infralittoral mixed sediment or rock (SS.SMp.KSwSS.FilG)

Priority Marine Feature	Component biotopes/ species (biotope/ common name)	Component biotopes/ species (biotope code/ species name)
<b>Maerl beds</b>	Maerl beds	SS.SMp.Mrl
<b>Maerl or coarse shell gravel with burrowing sea cucumbers</b>	<i>Neopentadactyla mixta</i> in circalittoral shell gravel or coarse sand	SS.SCS.CCS.Nmix
<b>Native oysters</b>	<i>Ostrea edulis</i> beds on shallow sublittoral muddy mixed sediment Native oyster	SS.SMx.IMx.Ost <i>Ostrea edulis</i>
<b>Northern sea fan and sponge communities</b>	<i>Caryophyllia smithii</i> and <i>Swiftia pallida</i> on circalittoral rock Mixed turf of hydroids and large ascidians with <i>Swiftia pallida</i> and <i>Caryophyllia smithii</i> on weakly tide-swept circalittoral rock Deep sponge communities (circalittoral) Northern sea fan	CR.MCR.EcCr.CarSwi CR.HCR.XFa.SwiLgAs CR.HCR.DpSp <i>Swiftia pallida</i>
<b>Seagrass beds</b>	<i>Zostera noltii</i> beds in littoral muddy sand <i>Zostera marina/angustifolia</i> beds on lower shore or infralittoral clean or muddy sand <i>Ruppia maritima</i> in reduced salinity infralittoral muddy sand	LS.LMp.LSgr.Znol SS.SMp.SSgr.Zmar SS.SMp.SSgr.Rup
<b>Sea loch egg wrack beds</b>	<i>Ascophyllum nodosum</i> ecad <i>mackaii</i> beds on extremely sheltered mid eulittoral mixed substrata	LR.LLR.FVS.Ascmac
<b>Serpulid aggregations</b>	<i>Serpula vermicularis</i> reefs on very sheltered circalittoral muddy sand <sup>15</sup>	SS.SBR.PoR.Ser
<b>Submarine structures made by leaking gases</b>	Submarine structures made by leaking gases	No code
<b>Tide-swept algal communities</b>	Fucoids in tide-swept conditions <i>Halidrys siliquosa</i> and mixed kelps on tide-swept infralittoral rock with coarse sediment Kelp and seaweed communities in tide-swept sheltered conditions <sup>16</sup> <i>Laminaria hyperborea</i> on tide-swept, infralittoral mixed substrata	LR.HLR.FT IR.HIR.KSed.XKHal IR.MIR.KT IR.MIR.KR.LhypTX
<b>Tide-swept coarse sands with burrowing bivalves</b>	<i>Moerella</i> spp. with venerid bivalves in infralittoral gravelly sand <sup>17</sup>	SS.SCS.ICS.MoeVen

<sup>15</sup> As well as the serpulid reefs biotope this PMF includes smaller aggregations of *Serpula vermicularis*

<sup>16</sup> The following sub-biotopes are specifically excluded: *Laminaria saccharina* with foliose red seaweeds and ascidians on sheltered tide-swept infralittoral rock (IR.MIR.KT.LsacT); & Filamentous red seaweeds, sponges and *Balanus crenatus* on tide-swept variable-salinity infralittoral rock (IR.MIR.KT.FilRVS)

<sup>17</sup> Recent data suggests that the community associated with this biotope may also be present in waters deeper than is characteristic of infralittoral biotopes. Pending further assessment and classification, this PMF includes examples of the community associated with SS.SCS.ICS.MoeVen even where it lies outside the typical depth range of the biotope.



**(b) species**

Priority Marine Feature	Taxon group	Species name
<b>Burrowing sea anemone</b>	Sea anemones, sea fans and seapens	<i>Arachnanthus sarsi</i>
<b>Pink sea fingers</b>	Sea anemones, sea fans and seapens	<i>Alcyonium hibernicum</i>
<b>White cluster anemone</b>	Sea anemones, sea fans and seapens	<i>Parazoanthus anguicomus</i>
<b>Northern feather star</b>	Starfish and feather stars	<i>Leptometra celtica</i>
<b>Fan mussel</b>	Snails, clams, mussels and oysters	<i>Atrina fragilis</i>
<b>Heart cockle</b>	Snails, clams, mussels and oysters	<i>Glossus humanus</i>
<b>Ocean quahog</b>	Snails, clams, mussels and oysters	<i>Arctica islandica</i>
<b>European spiny lobster</b>	Lobsters and sand hoppers	<i>Palinurus elephas</i>
<b>Eel</b> <i>(marine part of life cycle)</i>	Bony fish (catadromous)	<i>Anguilla anguilla</i>
<b>Atlantic salmon</b> <i>(marine part of life cycle)</i>	Bony fish (anadromous)	<i>Salmo salar</i>
<b>European river lamprey</b> <i>(marine part of life cycle)</i>	Bony fish (anadromous)	<i>Lampetra fluviatilis</i>
<b>Sea lamprey</b> <i>(marine part of life cycle)</i>	Bony fish (anadromous)	<i>Petromyzon marinus</i>
<b>Sea trout</b> <i>(marine part of life cycle)</i>	Bony fish (anadromous)	<i>Salmo trutta</i>
<b>Sparling</b> <i>(marine part of life cycle)</i>	Bony fish (anadromous)	<i>Osmerus eperlanus</i>
<b>Anglerfish (juveniles)</b>	Bony fish	<i>Lophius piscatorius</i>
<b>Atlantic herring (juveniles and spawning adults)</b>	Bony fish	<i>Clupea harengus</i>
<b>Atlantic mackerel</b>	Bony fish	<i>Scomber scombrus</i>
<b>Cod</b>	Bony fish	<i>Gadus morhua</i>
<b>Ling</b>	Bony fish	<i>Molva molva</i>
<b>Norway pout</b>	Bony fish	<i>Trisopterus esmarkii</i>
<b>Saithe (juveniles)</b>	Bony fish	<i>Pollachius virens</i>
<b>Sandeels</b>	Bony fish	<i>Ammodytes marinus</i> & <i>Ammodytes tobianus</i>
<b>Sand goby</b>	Bony fish	<i>Pomatoschistus minutus</i>
<b>Whiting (juveniles)</b>	Bony fish	<i>Merlangius merlangus</i>
<b>Basking shark</b>	Sharks, skates and rays	<i>Cetorhinus maximus</i>
<b>Common skate</b>	Sharks, skates and rays	Formerly <i>Dipturus batis</i> now split provisionally into <i>D. cf. flossada</i> and <i>D. cf. intermedia</i>
<b>Spiny dogfish</b>	Sharks, skates and rays	<i>Squalus acanthias</i>
<b>Bottlenose dolphin</b>	Whales, dolphins and porpoises	<i>Tursiops truncatus</i>
<b>Harbour porpoise</b>	Whales, dolphins and porpoises	<i>Phocoena phocoena</i>
<b>Killer whale</b>	Whales, dolphins and porpoises	<i>Orcinus orca</i>
<b>Minke whale</b>	Whales, dolphins and porpoises	<i>Balaenoptera acutorostrata</i>
<b>Risso's dolphin</b>	Whales, dolphins and porpoises	<i>Grampus griseus</i>
<b>Short-beaked common dolphin</b>	Whales, dolphins and porpoises	<i>Delphinus delphis</i>
<b>White-beaked dolphin</b>	Whales, dolphins and porpoises	<i>Lagenorhynchus albirostris</i>
<b>Harbour/common seal</b>	Seals	<i>Phoca vitulina</i>
<b>Grey seal</b>	Seals	<i>Halichoerus grypus</i>
<b>Otter</b>	Otter	<i>Lutra lutra</i>

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## 8 APPENDICES

# APPENDIX 1 ALL ORIGINAL LISTS OF SPECIES AND HABITATS

The original lists of species and habitats combined in Stage 1.

## Species

UK Biodiversity Action Plan
Scottish Biodiversity List
OSPAR List of Threatened and/or Declining Species and Habitats
Habitats and Birds Directives – Annexes 2,4 & 5
The Conservation (Natural habitats &c.) Regulations 1994 – Schedules 2 & 3
Nature Conservation (Scotland) Act 2004 – Schedule 5 & 8 species (including proposed schedule 5 & 8 species)
Species Action Framework - SNH
SSSI designated features
Nationally Important Marine Features (Irish Sea Pilot)
Nationally Important Marine Areas (Scottish marine environment link)
Species of Conservation Concern long list
Rare marine benthic flora and fauna in Great Britain: the development of criteria for assessment. <i>JNCC Report</i> , 240. JNCC: Peterborough, UK. 36 pp
Bern Convention Appendices
Biodiversity Lists - Long List (1995), middle list and short list
Bonn Convention Appendices
EC Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) – Annexes A & D
IUCN (1994) – List of Critically Endangered species (& pre-1994)
Wildlife and Countryside Act 1981 – Schedule 5
WWF healthcheck reports “flagship” species and habitats

## Habitats

UK Biodiversity Action Plan
Scottish Biodiversity List
OSPAR List of Threatened and/or Declining Species and Habitats
Habitats Directive – Annex 1
SSSI designated features
Ramsar designated features
Nationally Important Marine Features (Irish Sea Pilot)
Nationally Important Marine Areas (Scottish marine environment link)
WWF healthcheck reports “flagship” species and habitats

## APPENDIX 2 STAGE 2 - SCOTTISH LISTS COMPILED BY NATIONAL MUSEUMS OF SCOTLAND

### Appendix 2.1 Stage 2 - species list as received from National Museums of Scotland.

Species listed under existing conservation mechanisms that occur in Scottish territorial waters.

BAP/ NIMF	Marine group name	MCS (1997) biocode	Taxon	Common name	Occurs in Scotland	Additional comments	Source for establishing if present in Scottish territorial waters
Both	agnatha	ZE0011	<i>Lampetra fluviatilis</i>	River lamprey	Yes	Locally frequent (e.g. Forth estuary)	A Lyndon; Whitehead <i>et al</i> (eds), 1984-6
NIMF	alga	ZM0476	<i>Aglaothamnion diaphanum</i>	Red alga	Don't know	?Solway. No records (CAM)	MarBEF
NIMF	alga	ZM0477	<i>Aglaothamnion feldmanniae</i>	Red alga	Don't know	?Solway. No records (CAM)	MarBEF
NIMF	alga	ZM0481	<i>Aglaothamnion priceanum</i>	Red alga	Yes	Generally rare, Scotland has relatively high amount	Maggs & Hommersand 1993
NIMF	alga	ZM0588	<i>Apoglossocolax pusilla</i>	Red alga	Don't know	?Solway. No records (CAM)	MarBEF
Both	alga	ZR0375	<i>Ascophyllum nodosum ecad mackaii</i>	Wig Wrack or Sea-loch Egg Wrack	Yes	Widely distributed	British Phycological Society Atlas
neither	alga	ZR0164	<i>Asperococcus compressus</i>	Brown alga	Yes		Maggs 1986
NIMF	alga	ZR0166	<i>Asperococcus scaber</i>	Brown alga	Don't know	Don't know (CAM)	
neither	alga	ZM0369	<i>Callophyllis cristata</i>	Red alga	Yes	West coast & northwards	Maggs 1986
NIMF	alga	ZR0325	<i>Carpomitra costata</i>	Brown alga	Yes	St Kilda, Firth of Lorn	Maggs 1986
NIMF	alga	ZS0198	<i>Cladophora battersii</i>	Green alga	Probably	Probably (CAM)	Brodie <i>et al</i> (2007)
both	alga	ZM0314	<i>Cruoria cruoriaeformis</i>	Red alga	Yes	In Scotland acc. to Scottish list	NBN, MarBEF



BAP/ NIMF	Marine group name	MCS (1997) biocode	Taxon	Common name	Occurs in Scotland	Additional comments	Source for establishing if present in Scottish territorial waters
both	alga	ZM0288	<i>Dermocorynus montagnei</i>	Red alga	Yes	Islay, Outer Hebrides	NBN (no acc. to BAP distribution list!); MarBEF
NIMF	alga	ZR0335	<i>Desmarestia dresnayi</i>	Brown alga	Yes	Luce Bay, Firth of Lorn	NMS, Pers. obs
both	alga	ZR0380	<i>Fucus distichus</i>	Brown alga	Yes		BAP distribution list
NIMF	alga	ZM0163	<i>Gelidiella calicicola</i>	Red alga	Yes	No records in MarBEF/NBN	Maggs 1986
NIMF	alga	ZR0093	<i>Halothrix lumbricalis</i>	Brown alga	Yes	Pre 1903 record only?	Maggs 1986 NBN/MarBEF
neither	alga	ZM0294	<i>Halymenia latifolia</i>	Red alga	Possibly	Possibly - it is in Donegal	NBN, MarBEF
NIMF	alga	ZR0149	<i>Leblondiella densa</i>	Brown alga	Yes	Jura & Islay	Maggs 1986; NBN, MarBEF
both	alga	ZM0236	<i>Lithothamnion corallioides</i>	Coral Maërl	Yes	Records in Scotland probably refer to <i>Lithothamnion glaciale</i>	Maggs 1986
BAP	alga	ZM0255	<i>Phymatolithon calcareum</i>	Common Maërl	Yes		
neither	alga	ZR0393	<i>Sargassum muticum</i>	wireweed (none native - species for action!!)	Yes	NMS, Pers. obs	MarBEF/NBN
NIMF	alga	ZM0300	<i>Schmitzia hiscockiana</i>	Red alga	Yes		Maggs 1986; NBN, MarBEF
NIMF	alga	ZR0293	<i>Sphacelaria mirabilis</i>	Brown alga	Yes	1 record Small Isles. Not on MarBEF	NBN 1 record
NIMF	alga	ZM0381	<i>Tsengia bairdii</i> *	Red alga	Yes	2 record Harris. Not on MarBEF	NBN 1 record
NIMF	annelida	P0905	<i>Baldia johnstoni</i>		Yes		Garwood 1998
NIMF	annelida	P1116	<i>Sabellaria alveolata</i> *		Yes		MarLIN website
NIMF	annelida	P1117	<i>Sabellaria spinulosa</i> *		Yes		MarLIN website
neither	anthophyta	N/A	<i>Zostera marina</i>	Eelgrass	Yes		NMS, Pers. ob

BAP/ NIMF	Marine group name	MCS (1997) biocode	Taxon	Common name	Occurs in Scotland	Additional comments	Source for establishing if present in Scottish territorial waters
neither	bryozoa	Y0232	<i>Ammatophora nodulosa</i>		Don't know	Antrim & south-west, may turn up	Hayward & Ryland, 1998, MarBEF
neither	bryozoa	Y0087	<i>Arachnidium clavatum</i>		Yes	Shetland, Cumbrae, Summer Isles	Hayward, 1985, MarBEF
neither	bryozoa	Y0088	<i>Arachnidium fibrosum</i>		Yes	Found in Northumberland	Hayward, 1985, NBN, MarBEF
neither	bryozoa	Y0089	<i>Arachnidium hippotooides</i>		Don't know	Found in Northumberland & Isle of Man, no NBN records in Scotland, inconspicuous species	Hayward, 1985, NBN, MarBEF
neither	bryozoa	Y0086	<i>Arachnidium simplex</i>		Don't know	South-western sp	Hayward, 1985, MarBEF
NIMF	bryozoa	Y0182	<i>Aspidelectra melolontha</i>	Bryozoan	Don't know	Poss. Specimen from Orkney in BM	Hayward & Ryland 1998
neither	bryozoa	Y0140	<i>Bowerbankia gracillima</i>		Don't know	South-western sp	Hayward, 1985, MarBEF
neither	bryozoa	Y0247	<i>Bugula purpurotincta</i>	Bryozoan	Yes	Northern species	Hayward & Ryland, 1998, MarBEF
neither	bryozoa	Y0511	<i>Buskea quincuncialis</i>		Yes	Type from Minch, rare	Hayward and Ryland, 1999
NIMF	bryozoa	Y0497	<i>Celleporina decipiens</i>	Bryozoan	Yes	St Kilda & Hebrides	Hayward and Ryland, 1999, MarBEF
neither	bryozoa	Y0068	<i>Coronopora truncata</i>		Yes	north-west Britain	Hayward, 1985, MarBEF
neither	bryozoa	Y0451	<i>Cylindroporella tubulosa</i>	Bryozoan	Yes	Shetland & NE Scotland	Hayward and Ryland, 1999, MarBEF
NIMF	bryozoa	Y0359	<i>Escharoides mamillata</i>	Bryozoan	Yes		Hayward and Ryland, 1999, MarBEF
NIMF	bryozoa	Y0122	<i>Farrella repens</i>	Bryozoan	Yes	Solway Firth	Hayward, 1985, MarBEF
neither	bryozoa	Y0312	<i>Gephyrotes nitidopunctata</i>		Don't know	Arctic species, may turn up in Sheltand	Hayward & Ryland 1998, MarBEF
neither	bryozoa	Y0339	<i>Haplota clavata</i>		Yes	Northern species, in Clyde	Hayward & Ryland 1998, MarBEF
neither	bryozoa	Y0125	<i>Hypophorella expansa</i>		Yes	Clyde. Inconspicuous	Hayward, 1985

BAP/ NIMF	Marine group name	MCS (1997) biocode	Taxon	Common name	Occurs in Scotland	Additional comments	Source for establishing if present in Scottish territorial waters
NIMF	bryozoa	Y0513	<i>Palmicellaria elegans</i>	Bryozoan	Yes	Described from Shetland	Hayward and Ryland, 1999, MarBEF
neither	bryozoa	Y0383	<i>Porella alba</i>	Bryozoan	Yes	Known from single specimen found in Wick	Hayward and Ryland, 1999, MarBEF
NIMF	bryozoa	Y0469	<i>Schizomavella cristata</i>	Bryozoan	Possibly	S England & Faeroe	Hayward and Ryland, 1999, MarBEF
neither	bryozoa	Y0458	<i>Smittina crystallina</i>		Yes	Offshore, Shetland southwards	Hayward and Ryland, 1999, MarBEF
neither	charophyta	N/A	<i>Chara baltica</i>	stonewort	Yes	3 sites in Western Isles (1 former site in Orkney); threatened by salinity change due to sea level rise (possibly also by nutrient enrichment)	Nick Stewart
neither	charophyta	N/A	<i>Chara canescens</i>	Bearded stonewort	Yes	3 sites in Western Isles (1 former site in Orkney); threatened by salinity change due to sea level rise (possibly also by nutrient enrichment)	Nick Stewart
neither	charophyta	N/A	<i>Lamprothamniu m papulosum</i>	Foxtail stonewort	Yes	11 sites in Western Isles; threatened by salinity change due to sea level rise (possibly also by nutrient enrichment)	Nick Stewart
neither	charophyta	N/A	<i>Tolypella nidifica</i>	Bird`s nest stonewort	Yes	2 sites in Western Isles (2 former sites in Orkney - one last seen 1994); threatened by salinity change due to sea level rise (possibly also by nutrient enrichment)	Nick Stewart
NIMF	cnidaria	D0739	<i>Actinauge richardi</i>	deep water sea anemone	Yes	record from west coast of Scotland, deepwater North-East Atlantic species, at a depth below 50 metres	NBN Gateway

BAP/ NIMF	Marine group name	MCS (1997) biocode	Taxon	Common name	Occurs in Scotland	Additional comments	Source for establishing if present in Scottish territorial waters
NIMF	cnidaria	D0598	<i>Alcyonium glomeratum</i>	red dead men's fingers	Yes	Scottish west coast	NBN Gateway, Habitas
NIMF	cnidaria	D0601	<i>Alcyonium hibernicum</i> (was <i>Parerythropodium coralloides</i> )	pink sea fingers	Yes	Was known as <i>Parerythropodium coralloides</i> which is a Mediterranean species	BEP
both	cnidaria	D0745	<i>Amphianthus dohrnii</i>	Sea-fan Anemone	Yes	Scottish west coast, lives on seafans	NBN Gateway, Habitas
both	cnidaria	D0641	<i>Arachnanthus sarsi</i>	Burrowing sea anemone	Yes	Scottish west coast	NBN Gateway, Habitas
NIMF	cnidaria	D0782	<i>Caryophyllia inornata</i>	southern cup coral	Yes	South-west Scotland	NBN Gateway, Habitas
NIMF	cnidaria	D0783	<i>Caryophyllia smithii</i>	Devonshire cup-coral	Yes	widespread	NBN Gateway, Habitas
NIMF	cnidaria	D0414	<i>Diphasia alata</i>	hydroid	Yes	Loch Sunart	NBN gateway
NIMF	cnidaria	D0418	<i>Diphasia nigra</i>	hydroid	Yes	Sound of Jura 2008	BEP
NIMF	cnidaria	D0769	<i>Edwardsia sp. (non timida)</i>	Timid Burrowing Anemone	Yes	Scottish west coast. Not the E timida but another <i>Edwardsia</i> - needs follow-up by an expert (Meg Daly).	BEP
both	cnidaria	D0615	<i>Funiculina quadrangularis</i>	Tall seapen	Yes	Scottish west coast	NBN Gateway, Habitas
NIMF	cnidaria	D0748	<i>Halcampoides ?abyssorum</i>	Burrowing anemone	Yes	Scottish west coast. <i>Halcampoides</i> on the west coast of Scotland may be <i>H. abyssorum</i> - certainly the one George Brown photographed isn't <i>elongatus</i> .	BEP
both	cnidaria	D0011	<i>Haliclystus auricula</i>	a stalked jellyfish	Yes	Scottish west coast and recorded from southern east coast	NBN Gateway
neither	cnidaria	D0510	<i>Hartlaubella gelatinosa</i>	Hydroid	Yes	record on Scottish west & east coast	NBN Gateway, MarBEF

BAP/ NIMF	Marine group name	MCS (1997) biocode	Taxon	Common name	Occurs in Scotland	Additional comments	Source for establishing if present in Scottish territorial waters
both	cnidaria	D0017	<i>Lucernariopsis campanulata</i>	a stalked jellyfish	Yes	Scottish west coast	NBN Gateway
neither	cnidaria	D0518	<i>Obelia bidentata</i>	Hydroid	Yes		NBN Gateway, MarBEF
both	cnidaria	D0634	<i>Pachycerianthus multiplicatus</i>	Fireworks anemone	Yes	Occurs in Scottish Sea Lochs	NBN Gateway, Habitas
NIMF	cnidaria	D0737	<i>Paraphellia expansa</i>		Yes	Barra & Clyde, mostly southern	NBN Gateway, Habitas, MarBEF
NIMF	cnidaria	D0655	<i>Parazoanthus anguicomus</i>	White cluster anemone	Yes	Mainly in Scotland	NBN gateway
neither	cnidaria	D0656	<i>Parazoanthus axinellae</i>		Yes	some records w.coast	NBN gateway, habitas
NIMF	cnidaria	D0724	<i>Phellia gausapata</i>	Olive green wart anemone	Yes		NBN Gateway, Habitas,
NIMF	cnidaria	D0471	<i>Polyplumaria flabellata</i>		Yes	some records w.coast	NBN gateway
NIMF	cnidaria	D0771	<i>Scolanthus callimorphus</i>		Yes	one record Sunart	NBN Gateway, MarBef
both	cnidaria	D0608	<i>Swiftia pallida</i>	Northern sea fan	Yes	Occurs on the west coast of Scotland	NBN Gateway, Habitas, Ocean Biogeographic Information System
neither	cnidaria	D0440	<i>Tamarisca tamarisca</i>	Hydroid	Yes	Recorded from the west coast of Scotland and offshore North Sea	NBN Gateway, MarBEF
neither	cnidaria	D0474	<i>Ventromma halecioides</i>		Yes	widespread	NBN Gateway, MarBEF
BAP	chondrichthyes (cartilaginous fish)	(ZF0045 )	<i>Centrophorus squamosus</i>	Leafscraper shark	Yes	see Clark <i>et al</i> (2001)	A Lyndon; Whitehead <i>et al</i> (eds), 1984-6
BAP	chondrichthyes (cartilaginous fish)	ZF0052	<i>Centroscymnus coelolepsis</i>	Portuguese dogfish	Yes	see Clark <i>et al</i> (2001)	A Lyndon; Whitehead <i>et al</i> (eds), 1984-6
BAP	chondrichthyes (cartilaginous fish)	ZF0019	<i>Cetorhinus maximus</i>	Basking Shark	Yes	Frequent west coast; occasional northern Isles & Moray Firth	A Lyndon; Whitehead <i>et al</i> (eds), 1984-6

BAP/ NIMF	Marine group name	MCS (1997) biocode	Taxon	Common name	Occurs in Scotland	Additional comments	Source for establishing if present in Scottish territorial waters
BAP	chondrichthyes (cartilaginous fish)	ZF0055	<i>Dalatias licha</i>	Kitefin shark	Yes		A Lyndon; Whitehead <i>et al</i> (eds), 1984-6
BAP	chondrichthyes (cartilaginous fish)	ZF0086	<i>Dipturus batis</i> ( <i>Raja batis</i> )	Common skate	Yes	Depleted and vulnerable in most areas: Sound of Mull/Firth of Lorne and Northern Isles main foci of Scottish population	A Lyndon; Whitehead <i>et al</i> (eds), 1984-6
neither	chondrichthyes (cartilaginous fish)	ZF0096	<i>Dipturus nidarosiensis</i>	Black Skate	Possibly	Rockall Trough - centre of distribution; Right on edge of 200 mile limit	A Lyndon; Whitehead <i>et al</i> (eds), 1984-6
BAP	chondrichthyes (cartilaginous fish)	ZF0035	<i>Galeorhinus galeus</i>	Tope shark	Yes	Distribution focused in south-west and Firth of Lorne; elsewhere occasional	A Lyndon; Whitehead <i>et al</i> (eds), 1984-6
BAP	chondrichthyes (cartilaginous fish)	ZF0016	<i>Lamna nasus</i>	Porbeagle shark	Yes	Present in low numbers, especially west and north, although also recorded from North Sea installations	A Lyndon; Whitehead <i>et al</i> (eds), 1984-6
BAP	chondrichthyes (cartilaginous fish)	ZF0088	<i>Leucoraja circularis</i>	Sandy ray	Yes	northern limit of range	A Lyndon; Whitehead <i>et al</i> (eds), 1984-6
BAP	chondrichthyes (cartilaginous fish)	ZF0041	<i>Prionace glauca</i>	Blue shark	Yes	Rare	A Lyndon; Whitehead <i>et al</i> (eds), 1984-6
neither	chondrichthyes (cartilaginous fish)	ZF0089	<i>Raja clavata</i>	Roker	Yes		A Lyndon; Whitehead <i>et al</i> (eds), 1984-6
neither	chondrichthyes (cartilaginous fish)	ZF0094	<i>Raja montagui</i> (Fowler, 1910) (synonym: <i>Dipturus montagui</i> )	Spotted Ray	Yes	northern limit of range	A Lyndon; Whitehead <i>et al</i> (eds), 1984-6
BAP	chondrichthyes (cartilaginous fish)	ZF0066	<i>Squalus acanthias</i>	Spiny dogfish	Yes	Mainly in western sea lochs - population apparently in decline	A Lyndon; Whitehead <i>et al</i> (eds), 1984-6

BAP/ NIMF	Marine group name	MCS (1997) biocode	Taxon	Common name	Occurs in Scotland	Additional comments	Source for establishing if present in Scottish territorial waters
NIMF	crustacea - caprellidea	S0653	<i>Parvipalpus capillaceus*</i>	Amphipod	Yes	Rare	G Moore
neither	crustacea - decapoda	S1522	<i>Achaeus cranchii</i>	Crab	Yes		MarLIN; Ingle, 1996; G Moore
neither	crustacea - decapoda	S1575	<i>Bathynectes longipes</i>	Crab	Yes	St Kilda sea caves	G Moore; MarLIN; <a href="http://www.jncc.gov.uk/ProtectedSites/SACselection/sac.asp?EUCode=UK0013695">http://www.jncc.gov.uk/ProtectedSites/SACselection/sac.asp?EUCode=UK0013695</a>
both	crustacea - decapoda	S1430	<i>Palinurus elephas</i>	Europea spiny lobster	Yes		MarLIN; Ingle & Christiansen, 2004; G Moore
neither	crustacea - decapoda	S1559	<i>Thia scutellata</i>	Crab	Yes		MarLIN; G Moore
NIMF	crustacea - gammaridea	S0560	<i>Cerapus crassicornis*</i>	Amphipod	Yes		Lincoln, 1979; G Moore
NIMF	crustacea - gammaridea	S0608	<i>Corophium affine*</i>	Amphipod	Yes		Lincoln, 1979; G Moore
NIMF	crustacea - gammaridea	S0626	<i>Dulichia tuberculata*</i>	Amphipod	Yes	Rare; In Clyde Sea; Scotland at southern limit of range in NE Atlantic	G Moore; Lincoln, 1979
NIMF	crustacea - gammaridea	S0510	<i>Eriopisa elongate</i> (Corrected name: <i>Eriopisa elongata</i> )	Amphipod	Yes	Rare; In Clyde Sea; Maybe commoner than records suggest, burrows in deepwater muds hence poorly collected	G Moore; Lincoln, 1979
NIMF	crustacea - gammaridea	S0631	<i>Laetmatophilus tuberculatus</i>	Amphipod	Yes		Hansson, 1998; G Moore
NIMF	crustacea - gammaridea	S0588	<i>Leptocheirus hirsutimanus*</i>	Amphipod	Yes		Lincoln, 1979; G Moore
NIMF	crustacea - gammaridea	S0589	<i>Leptocheirus pectinatus*</i>	Amphipod	Yes		Lincoln, 1979; G Moore
NIMF	crustacea - gammaridea	S0518	<i>Maera loveni*</i>	Mud burrowing amphipod	Yes		Lincoln, 1979; G Moore

BAP/ NIMF	Marine group name	MCS (1997) biocode	Taxon	Common name	Occurs in Scotland	Additional comments	Source for establishing if present in Scottish territorial waters
NIMF	crustacea - gammaridea	S0619	<i>Siphonocetes striatus*</i>	Amphipod	Yes		Lincoln, 1979; G Moore
NIMF	crustacea - ingolfiellidea	S0789	<i>Ingolfiella britannica</i>	Amphipod	Don't know		G Moore
NIMF	crustacea - tanaidacea	S1135	<i>Leptognathia paramaca</i> (Corrected name: <i>Leptognathia paramanca</i> )		Don't know		G Moore
NIMF	echinodermata	ZB0060	** <i>Asterina phylactica</i>		Yes	Number of specimens found in Siginish Rapids, inner Loch Maddy during monitoring trials in 1998 & 1999. CMHowson. Otherwise southern distribution	C M Howson
NIMF	echinodermata	ZB0011	<i>Antedon petasus</i>	Feather star	Yes	northern species which occurs subtidally and in deeper water off western Scotland; sea loch habitat important; may retreat northward with climate warming	E Southward; Southward & Campbell, 2006
NIMF	echinodermata	ZB0109	<i>Asteronyx loveni</i>	Deepwater brittlestar	Yes	widespread deep water species found in some west coast sea lochs and northern North Sea	E Southward; Southward & Campbell, 2006
NIMF	echinodermata	ZB0268	<i>Cucumaria frondosa*</i>	Orange- footed sea cucumber	Yes	Arctic species reaching southern limit in NE Scotland; may retreat northward with climate warming	E Southward; Echinoderm Survey; Southward & Campbell, 2006
NIMF	echinodermata	ZB0198	<i>Echinus esculentus</i>	Edible sea urchin	Yes	widespread on western coasts and in Shetland and Orkney; uncommon on east coast	E Southward; Echinoderm Survey; Southward & Campbell, 2006
NIMF	echinodermata	ZB0051	<i>Hippasteria phrygiana</i>	Rigid cushion star	Yes	northern and North Sea species occasionally found offshore in western Scotland; could retreat northward with climate warming	E Southward; Echinoderm Survey; Southward & Campbell, 2006



BAP/ NIMF	Marine group name	MCS (1997) biocode	Taxon	Common name	Occurs in Scotland	Additional comments	Source for establishing if present in Scottish territorial waters
NIMF	echinodermata	ZB0015	<i>Leptometra celtica</i>	Northern feather star	Yes	generally western and deep water species found in some west coast sea lochs; could be affected by loss of habitat	E Southward; Southward & Campbell, 2006
NIMF	echinodermata	ZB0276	<i>Ocnus planci</i>	Sea cucumber	Probably	reported as characteristic of west coast sea lochs but identification of Ocnus spp. difficult/confused	E Southward; Southward & Campbell, 2006
NIMF	echinodermata	ZB0130	<i>Ophiopsila annulosa</i> ***	Brittlestar	Yes	southern species which may extend as far north as Oban. Found on Garvellachs, Firth of Lorn, in 1981 by Howson & Picton.	E Southward; <a href="http://www.habitas.org.uk/marinelife/species.asp?item=ZB2470">http://www.habitas.org.uk/marinelife/species.asp?item=ZB2470</a> ; Southward & Campbell, 2006
NIMF	echinodermata	ZB0202	<i>Paracentrotus lividus</i> *	Purple sea urchin	Yes	southern species which occurs very rarely in Scotland; may increase with climate warming	E Southward; Echinoderm Survey; Southward & Campbell, 2006
NIMF	echinodermata	ZB0239	<i>Parastichopus tremulus</i>	Sea cucumber	Probably	records uncertain; typically a deep water species found on edge of continental shelf and Scandinavian fjords	E Southward; Southward & Campbell, 2006
NIMF	echinodermata	ZB0252	<i>Psolus phantapus</i>	Sea cucumber	Yes	occasional	E Southward; Echinoderm Survey; Southward & Campbell, 2006
NIMF	echinodermata	ZB0205	<i>Strongylocentrotus droebachiensis</i> *	Northern sea urchin	Yes	northern species; Shetland, Orkney and rarely on the east coast (Moray Firth and Firth of Forth); could be reduced by climate warming	E Southward; Echinoderm Survey; Southward & Campbell, 2006
NIMF	echinodermata	ZB0263	<i>Thyone inermis</i>	Sea cucumber	Possibly	records uncertain	E Southward; Southward & Campbell, 2006
neither	echiura	O0013	<i>Amalosoma eddystonense</i>	echiuran worm	Don't know	MarLIN website photo shows bifid proboscis; Hayward & Ryland state 'ovoid'; validity of records unknown	T Worsfold; MarLIN website
both	mammalia	ZK0065	<i>Balaenoptera acutorostrata</i>	Minke whale	Yes	Locally common	J Herman; JNCC Atlas of Cetacean Distribution in north-west European waters

BAP/ NIMF	Marine group name	MCS (1997) biocode	Taxon	Common name	Occurs in Scotland	Additional comments	Source for establishing if present in Scottish territorial waters
both	mammalia	ZK0066	<i>Balaenoptera borealis</i>	Sei whale	Yes	Rare	J Herman; JNCC Atlas of Cetacean Distribution in north-west European waters
both	mammalia	ZK0067	<i>Balaenoptera musculus (Sibbaldus musculus)</i>	Blue whale	Yes	Very rare	J Herman; JNCC Atlas of Cetacean Distribution in north-west European waters
both	mammalia	ZK0068	<i>Balaenoptera physalus</i>	Fin whale	Yes	Rare	J Herman; JNCC Atlas of Cetacean Distribution in north-west European waters
both	mammalia	ZK0026	<i>Delphinus delphis</i>	Short beaked common dolphin	Yes	Locally common	J Herman; JNCC Atlas of Cetacean Distribution in north-west European waters
both	mammalia	ZK0073	<i>Eubalaena glacialis (Balaena glacialis)</i>	Northern right whale (black right whale)	Yes	Very rare	J Herman; JNCC Atlas of Cetacean Distribution in north-west European waters
both	mammalia	ZK0039	<i>Globicephala melas</i>	Long-finned pilot whale	Yes	Locally common	J Herman; JNCC Atlas of Cetacean Distribution in north-west European waters
both	mammalia	ZK0037	<i>Grampus griseus</i>	Risso's dolphin	Yes	Rare	J Herman; JNCC Atlas of Cetacean Distribution in north-west European waters
NIMF	mammalia	ZK0015	<i>Halichoerus grypus</i>	Grey seal	Yes	Locally common	J Herman; JNCC Report; A review of British Mammals: population estimates and conservation status of British Mammals other than cetaceans
both	mammalia	ZK0061	<i>Hyperoodon ampullatus</i>	Northern bottlenose whale	Yes	Rare	J Herman; JNCC Atlas of Cetacean Distribution in north-west European waters
NIMF	mammalia	ZK0050	<i>Kogia (Physter) breviceps</i>	Pygmy sperm whale	Yes	Very rare or vagrant	J Herman; JNCC Atlas of Cetacean Distribution in north-west European waters

BAP/ NIMF	Marine group name	MCS (1997) biocode	Taxon	Common name	Occurs in Scotland	Additional comments	Source for establishing if present in Scottish territorial waters
both	mammalia	ZK0030	<i>Lagenorhynchus acutus</i>	Atlantic white-sided dolphin	Yes	Locally common	J Herman; JNCC Atlas of Cetacean Distribution in north-west European waters
both	mammalia	ZK0031	<i>Lagenorhynchus albirostris</i>	White- beaked dolphin	Yes	Locally common	J Herman; JNCC Atlas of Cetacean Distribution in north-west European waters
neither	mammalia	ZK0004	<i>Lutra lutra</i>	Otter	Yes	Locally common	J Herman; Harris <i>et al</i> 1995
both	mammalia	ZK0070	<i>Megaptera novaeangliae</i>	Humpback whale	Yes	Rare	J Herman; JNCC Atlas of Cetacean Distribution in north-west European waters
both	mammalia	ZK0055	<i>Mesoplodon bidens</i>	Sowerby`s beaked whale	Yes	Rare	J Herman; JNCC Atlas of Cetacean Distribution in north-west European waters
both	mammalia	ZK0035	<i>Orcinus orca</i>	Killer whale	Yes	Locally common	J Herman; JNCC Atlas of Cetacean Distribution in north-west European waters
both	mammalia	ZK0013	<i>Phoca vitulina</i>	Harbour seal/common seal	Yes	Locally common	J Herman; Harris <i>et al</i> 1995
both	mammalia	ZK0042	<i>Phocoena phocoena</i>	Harbour porpoise	Yes	Locally common	J Herman; JNCC Atlas of Cetacean Distribution in north-west European waters
both	mammalia	ZK0052	<i>Physeter macrocephalus (Physeter catodon)</i>	Sperm whale	Yes	Locally common	J Herman; JNCC Atlas of Cetacean Distribution in north-west European waters
both	mammalia	ZK0033	<i>Pseudorca crassidens</i>	False killer whale	Yes	Very rare, occasional	J Herman; JNCC Atlas of Cetacean Distribution in north-west European waters
both	mammalia	ZK0024	<i>Stenella coeruleoalba</i>	Striped dolphin	Yes	Locally common	J Herman; JNCC Atlas of Cetacean Distribution in north-west European waters

BAP/ NIMF	Marine group name	MCS (1997) biocode	Taxon	Common name	Occurs in Scotland	Additional comments	Source for establishing if present in Scottish territorial waters
both	mammalia	ZK0028	<i>Tursiops truncatus</i>	Bottlenosed dolphin	Yes	Locally common	J Herman; JNCC Atlas of Cetacean Distribution in north-west European waters
both	mammalia	ZK0059	<i>Ziphius cavirostris</i>	Cuvier`s beaked whale	Yes	Rare	J Herman; JNCC Atlas of Cetacean Distribution in north-west European waters
NIMF	mollusca - gastropoda	W1488	<i>Aeolidiella sanguinea</i>	sea slug	Possibly - British		MarLIN; Picton & Morrow, 1994; Thompson, 1988
neither	mollusca - gastropoda	W1366	<i>Aldisa zetlandica</i>	sea slug	Yes	rare	Picton & Morrow, 1994; Thompson, 1988
NIMF	mollusca - gastropoda	W0340	<i>Alvania cancellata</i>	marine snail	Yes	at northern limit of range	Graham, 1988
NIMF	mollusca - gastropoda	W0342	<i>Alvania jeffreysi</i>	marine snail	Yes	rare; one record off Uist	Graham, 1988
NIMF	mollusca - gastropoda	(W0335)	<i>Alvania wyvillethompson i</i> (Corrected name: <i>Alvania wyvillethomsoni</i> )	marine snail	Possibly - British		Smith & Heppell, 1991
NIMF	mollusca - gastropoda	W0363	<i>Alvania zetlandica</i>	marine snail	Yes - dead shells only (S Smith)	uncommon	Graham, 1988
NIMF	mollusca - gastropoda	W0499	<i>Amauropsis islandicus</i>	Iceland moonsnail	Yes	northern North Sea only	Graham, 1988
NIMF	mollusca - gastropoda	W0781	<i>Bathybela nudator</i>	marine snail	Possibly - British		Smith & Heppell, 1991
NIMF	mollusca - gastropoda	W0606	<i>Bathycrinicola curta</i>	marine snail	Possibly - British	northern distribution	Smith & Heppell, 1991

BAP/ NIMF	Marine group name	MCS (1997) biocode	Taxon	Common name	Occurs in Scotland	Additional comments	Source for establishing if present in Scottish territorial waters
NIMF	mollusca - gastropoda	(W0605)	<i>Bathycrinicola macrapex</i> (Corrected name: <i>B. micrapex</i> )	marine snail	Possibly - British	southern distribution	Smith & Heppell, 1991
NIMF	mollusca - gastropoda	(W0770)	<i>Benthomangelia macra</i>	marine snail	Possibly - British		Smith & Heppell, 1991
NIMF	mollusca - gastropoda	(W0672)	<i>Boreotrophon dabneyi</i>	marine snail	Possibly - British		Smith & Heppell, 1991
NIMF	mollusca - gastropoda	W0920	<i>Brachystomia carrozzai/Odost omia carrozzai</i>	marine snail	Yes		EurOBIS distribution records; Graham, 1988 (as <i>B. albella</i> )
neither	mollusca - gastropoda	W0706	<i>Buccinum humphreysianu m</i>	marine snail	Yes	Shetlands, Hebrides	Graham, 1988
NIMF	mollusca - gastropoda	W0707	<i>Buccinum oblitum</i>	marine snail	Possibly - British		Smith & Heppell, 1991
NIMF	mollusca - gastropoda	W1122	<i>Calliopaea oophaga</i>	marine snail	Possibly - British		Thompson, 1988; EurOBIS distribution records
neither	mollusca - gastropoda	W0408	<i>Ceratia proxima</i>		Yes - dead shells only (S Smith)	uncommon	Graham, 1988
neither	mollusca - gastropoda	W0424	<i>Circulus striatus</i>	marine snail	Possibly - British		Graham, 1988
NIMF	mollusca - gastropoda	W0201	<i>Cirsonella romettensis</i>	marine snail	Possibly - British		Smith & Heppell, 1991
NIMF	mollusca - gastropoda	(W0541)	<i>Claviscala richardi</i>	marine snail	Possibly - British		Smith & Heppell, 1991
NIMF	mollusca - gastropoda	(W0599)	<i>Crinolamia angustispira</i>	marine snail	Possibly - British		Smith & Heppell, 1991

BAP/ NIMF	Marine group name	MCS (1997) biocode	Taxon	Common name	Occurs in Scotland	Additional comments	Source for establishing if present in Scottish territorial waters
NIMF	mollusca - gastropoda	(W0599)	<i>Curveulima macrophthalmica</i>	marine snail	Possibly - British		Smith & Heppell, 1991
NIMF	mollusca - gastropoda	W0203	<i>Dikoleps cutleriana</i>	marine snail	Yes	Hebrides - northern limit of range	Graham, 1988
NIMF	mollusca - gastropoda	W0547	<i>Epitonium greenlandicum</i>	Greenland wentletrap	Possibly - British	northern distribution	Smith & Heppell, 1991
neither	mollusca - gastropoda	W1446	<i>Eubbranchus doriae</i>		Yes		Picton & Morrow, 1994
neither	mollusca - gastropoda	W1468	<i>Facelina annulicornis</i>		Possibly - British		Picton & Morrow, 1994; Thompson, 1988
NIMF	mollusca - gastropoda	(W0599)	<i>Fusceulima profectilabrum</i> (Corrected name: <i>Fusceulima projectilabrum</i> )	marine snail	Possibly		inferred from Hansson, 1998
NIMF	mollusca - gastropoda	(W0194)	<i>Ganesa nitidiscula</i> (Corrected name: <i>Ganesa nitidiscula</i> )	marine snail	Possibly - British	northern distribution	Smith & Heppell, 1991
NIMF	mollusca - gastropoda	(W0770)	<i>Gymnobela aquilarum</i>	marine snail	Possibly - British	southern distribution	Smith & Heppell, 1991
NIMF	mollusca - gastropoda	(W0770)	<i>Gymnobela engonia</i>	marine snail	Possibly - British	southern distribution	Smith & Heppell, 1991
NIMF	mollusca - gastropoda	(W0883)	<i>Heliacus subvariegatus</i>	marine snail	Possibly - British		Smith & Heppell, 1991
neither	mollusca - gastropoda	W1413	<i>Hero formosa</i>	sea slug	Yes	scarce	Picton & Morrow, 1994; Thompson, 1988
neither	mollusca - gastropoda	W0384	<i>Hydrobia acuta neglecta</i>		Yes		Graham, 1988
neither	mollusca - gastropoda	(W0383)	<i>Hydrobia ventrosa</i>		Yes		Graham, 1988

BAP/ NIMF	Marine group name	MCS (1997) biocode	Taxon	Common name	Occurs in Scotland	Additional comments	Source for establishing if present in Scottish territorial waters
NIMF	mollusca - gastropoda	(W1338)	<i>Kaloplocamus ramosus</i>	sea slug	Possibly - British	northern species	Smith & Heppell, 1991
NIMF	mollusca - gastropoda	W0237	<i>Lepeta caeca</i>	limpet	Yes - dead shells only (S Smith)	rare - southern limit of distribution	Graham, 1988
NIMF	mollusca - gastropoda	(W0948)	<i>Liostomia clavula</i>	marine snail	Yes		Graham, 1988
NIMF	mollusca - gastropoda	(W0194)	<i>Lissotesta turrita</i>	marine snail	Possibly		inferred from Hansson, 1998
NIMF	mollusca - gastropoda	(W0771)	<i>Lusitanops sigmoidea</i>	marine snail	Possibly - British	southern distribution	Smith & Heppell, 1991
neither	mollusca - gastropoda	W0361	<i>Manzonina crassa</i>		Yes	widespread	Graham, 1988
NIMF	mollusca - gastropoda	(W0148)	<i>Margarites groenlandicus</i>	Greenland margarite	Yes	rare; Scotland at southern limit of range	Graham, 1988
NIMF	mollusca - gastropoda	(W0699)	<i>Metzgeria gagei</i>	marine snail	Possibly - British		Smith & Heppell, 1991
NIMF	mollusca - gastropoda	(W670)	<i>Mitrella rosacea</i>	marine snail	Possibly - British		Smith & Heppell, 1991
NIMF	mollusca - gastropoda	W0725	<i>Mohnia mohni</i>	marine snail	Possibly - British		Smith & Heppell, 1991
neither	mollusca - gastropoda	W0687	<i>Nucella lapillus</i> (Linnæus, 1758)	Dog whelk	Yes	Common	Graham, 1988
NIMF	mollusca - gastropoda	W0911	<i>Odostomia angusta*</i>	marine snail	Possibly - British		Smith & Heppell, 1991
NIMF	mollusca - gastropoda	(W0908)	<i>Odostomia nitens</i>	marine snail	Possibly - British		Smith & Heppell, 1991
NIMF	mollusca - gastropoda	(W0812)	<i>Oenopota dictyophora</i>	marine snail	Possibly - British	southern distribution	Smith & Heppell, 1991

BAP/ NIMF	Marine group name	MCS (1997) biocode	Taxon	Common name	Occurs in Scotland	Additional comments	Source for establishing if present in Scottish territorial waters
NIMF	mollusca - gastropoda	(W0812)	<i>Oenopota scalaris</i>	marine snail	Possibly - British		Smith & Heppell, 1991
neither	mollusca - gastropoda	W1310	<i>Okenia leachii</i>		Yes	rare	Picton & Morrow, 1994; Thompson, 1988
NIMF	mollusca - gastropoda	W1499	<i>Onchidella celtica</i>	sea slug	Yes		MarLIN; EurOBIS distribution records
NIMF	mollusca - gastropoda	(W0599)	<i>Ophieulima minima</i>	marine snail	Possibly - British		Smith & Heppell, 1991
NIMF	mollusca - gastropoda	W0250	<i>Osteopelta ceticola</i>	limpet	Possibly - British		Howson & Picton, 1997
NIMF	mollusca - gastropoda	W1502	<i>Otina ovata</i>		Yes		EurOBIS distribution records
NIMF	mollusca - gastropoda	(W0541)	<i>Papuliscala cerithielloides</i>	marine snail	Possibly		inferred from Hansson, 1998
neither	mollusca - gastropoda	W0230	<i>Patella ulyssiponensis aspera</i> (Röding, 1798)	Azorean limpet	Yes	widespread	Graham, 1988
NIMF	mollusca - gastropoda	W1042	<i>Philine lima</i>	File paper- bubble	Possibly - British		Smith & Heppell, 1991
NIMF	mollusca - gastropoda	W0373	<i>Pseudosetia turgida</i>	marine snail	Possibly - British		Smith & Heppell, 1991
NIMF	mollusca - gastropoda	W1063	<i>Rhynodiaphana ventricosa</i>	marine snail	Possibly - British		Smith & Heppell, 1991
neither	mollusca - gastropoda	W0453	<i>Simnia patula</i>		Yes	uncommon; western coasts north to Orkney	Graham, 1988
NIMF	mollusca - gastropoda	W0197	<i>Skenea ossiansarsi</i>	marine snail	Possibly - British		Howson & Picton, 1997
NIMF	mollusca - gastropoda	(W0195)	<i>Skenea profunda</i>	marine snail	Possibly - British		Smith & Heppell, 1991
NIMF	mollusca - gastropoda	W0190	<i>Solaria obscura</i> (if this = <i>Solariella obscura</i> )	marine snail	Possibly - British	northern distribution	Smith & Heppell, 1991



BAP/ NIMF	Marine group name	MCS (1997) biocode	Taxon	Common name	Occurs in Scotland	Additional comments	Source for establishing if present in Scottish territorial waters
NIMF	mollusca - gastropoda	W0189	<i>Solariella amabilis</i>	marine snail	Yes	rare; off Shetland	Graham, 1988
NIMF	mollusca - gastropoda	W0188	<i>Solariella cincta</i>	marine snail	Possibly - British		Smith & Heppell, 1991
NIMF	mollusca - gastropoda	(W0187)	<i>Solariella varicosa</i>	marine snail	Possibly - British	southern distribution	Smith & Heppell, 1991
neither	mollusca - gastropoda	W1121	<i>Steliger bellulus</i> (Corrected name: <i>Stiliger bellulus</i> )	sea slug	Possibly - British		Smith & Heppell, 1991
both	mollusca - gastropoda	W1443	<i>Tenellia adspersa</i>	Lagoon sea slug	Possibly - British		MarLIN; Picton & Morrow, 1994; Thompson, 1988
NIMF	mollusca - gastropoda	W1000	<i>Tjaernoëia exquisita</i>	marine snail	Yes		Graham, 1988 (as <i>Tornus exquisitus</i> )
neither	mollusca - gastropoda	W1318	<i>Trapania pallida</i>	sea slug	Yes	scarce; southern distribtion	Picton & Morrow, 1994
NIMF	mollusca - gastropoda	(W1246)	<i>Tritonia episcopalis</i>	sea slug	Possibly - British		Smith & Heppell, 1991
NIMF	mollusca - gastropoda	(W0733)	<i>Turrisipho lachesis</i>	Destiny Colus	Possibly - British		Smith & Heppell, 1991
NIMF	mollusca - gastropoda	(W0194)	<i>Xyloskenea naticiformis</i>	marine snail	Possibly		inferred from Hansson, 1998
neither	mollusca - pelecypoda	W1942	<i>Acanthocardia aculeata</i>	Spiny cockle	Yes	southern distribution	MarLIN; Smith & Heppell, 1991
NIMF	mollusca - pelecypoda	W2072	<i>Arctica islandica</i>	Ocean quahog	Yes		MarLIN; Tebble, 1976
NIMF	mollusca - pelecypoda	(W1922)	<i>Astarte acuticostata</i>	marine bivalve	Possibly - British		Smith & Heppell, 1991
both	mollusca - pelecypoda	W1733	<i>Atrina fragilis</i>	Fan mussel	Yes		MarLIN; Tebble, 1976
NIMF	mollusca - pelecypoda	W2181	<i>Barnea candida</i>	marine bivalve	Yes		MarLIN; Tebble, 1976

BAP/ NIMF	Marine group name	MCS (1997) biocode	Taxon	Common name	Occurs in Scotland	Additional comments	Source for establishing if present in Scottish territorial waters
NIMF	mollusca - pelecypoda	(W1789)	<i>Chlamys alicei</i> (Accepted name: <i>Pseudamussium alicei</i> )	marine bivalve	Possibly - British		Smith & Heppell, 1991
NIMF	mollusca - pelecypoda	(W1774)	<i>Chlamys sulcata</i>	marine bivalve	Yes	rare	Tebble, 1976
neither	mollusca - pelecypoda	W1898	<i>Devonia perrieri</i>		Yes		Tebble, 1976
NIMF	mollusca - pelecypoda	W2081	<i>Glossus humanus</i>	heart cockle	Yes		Tebble, 1976
NIMF	mollusca - pelecypoda	(W1885)	<i>Lepton lacerum</i>	marine bivalve	Possibly - British		Smith & Heppell, 1991
neither	mollusca - pelecypoda	W1741	<i>Limaria hians</i>	File shell/ flame shell	Yes	locally common	MarLIN; Tebble, 1976
NIMF	mollusca - pelecypoda	(W1561)	<i>Malletia abyssorum</i>	marine bivalve	Possibly - British		Smith & Heppell, 1991
NIMF	mollusca - pelecypoda	W1900	<i>Mancikellia pumila</i>	marine bivalve	Possibly - British		Smith & Heppell, 1991
NIMF	mollusca - pelecypoda	W1702	<i>Modiolus modiolus</i>	Horse mussel	Yes	locally common	MarLIN; Tebble, 1976
NIMF	mollusca - pelecypoda	(W2276)	<i>Myonera sulcifera</i>	marine bivalve	Possibly - British		Smith & Heppell, 1991
NIMF	mollusca - pelecypoda	W1766	<i>Neopycnodonte cochlear</i>	Deepsea oyster	Possibly - British	southern species	Smith & Heppell, 1991
NIMF	mollusca - pelecypoda	(W1565)	<i>Nucula tumidula</i>	marine bivalve	Possibly - British		Smith & Heppell, 1991
NIMF	mollusca - pelecypoda	W1591	<i>Nuculana pernula</i>	northern nutclam	Possibly - British		Smith & Heppell, 1991
both	mollusca - pelecypoda	W1758	<i>Ostrea edulis</i>	Native Oyster	Yes		MarLIN; Tebble, 1976
both	mollusca - pelecypoda	W1838	<i>Thyasira gouldi</i>	Northern Hatchet-Shell	Yes	Scotland at southern limit of range in North-East Atlantic; Loch Etive, Shetland, Firth of Forth, west coast	MarLIN; Oliver & Killeen, 2002

BAP/ NIMF	Marine group name	MCS (1997) biocode	Taxon	Common name	Occurs in Scotland	Additional comments	Source for establishing if present in Scottish territorial waters
NIMF	mollusca - pelecypoda	W2294	<i>Tropidomya abbreviata</i>	marine bivalve	Yes		Tebble, 1976
NIMF	mollusca - polyplacophora	W0066	<i>Hanleya nagelfa</i> (Corrected name: <i>Hanleya nagelfar</i> )	chiton	Possibly - British	northern species	Smith & Heppell, 1991
NIMF	mollusca - polyplacophora	(W0050)	<i>Leptochiton sarsi</i>	chiton	Possibly - British	northern species	Smith & Heppell, 1991
NIMF	mollusca - solenogastres	W0018	<i>Nematomenia banyulesis</i> (Corrected name: <i>Nematomenia banyulensis</i> )		Yes		Jones and Baxter, 1987
NIMF	mollusca - solenogastres	W0031	<i>Neomenia dalyelli</i>	chiton	Yes	Shetland Isles	Jones and Baxter, 1987
neither	nemertea	G0088	<i>Amphiporus hastatus</i>		Yes	Rare but widespread, supposedly occurring in Mediterranean, northern European, Greenland and Atlantic USA waters. A species badly in need of redescription.	Personal notes from Gibson for Scottish Biodiversity List
neither	nemertea	G0006	<i>Carinoma armandi</i>		Yes	Known from only two localities, St Andrews in Scotland and Southport, England.	Personal notes from Gibson for Scottish Biodiversity List
neither	nemertea	G0041	<i>Cerebratulus fuscus</i>		Yes	Uncommon, sporadic in distribution from European waters, known from one location on the North Sea coast of Scotland	Personal notes from Gibson for Scottish Biodiversity List
neither	nemertea	G0103	<i>Emplectonema neesii</i>		Yes	Though possessing a recorded distribution from Iceland to northern coasts of Europe and into the Mediterranean, this species is not apparently common.	Personal notes from Gibson for Scottish Biodiversity List

BAP/ NIMF	Marine group name	MCS (1997) biocode	Taxon	Common name	Occurs in Scotland	Additional comments	Source for establishing if present in Scottish territorial waters
neither	nemertea	G0105	<i>Nemertopsis flavida</i>		Yes	A poorly known taxon with a complex synonymy, supposedly found with a range extending from Denmark to the Mediterranean; known only from St Andrews in Scotland.	Personal notes from Gibson for Scottish Biodiversity List
neither	nemertea	G0013	<i>Procephalothrix filiformis</i>		Yes	In Scotland known only from St Andrews, elsewhere sporadically recorded from the west coast of Eire, the Channel Islands and north-west coasts of France.	Personal notes from Gibson for Scottish Biodiversity List
neither	nemertea	G0092	<i>Psammamphiporus elongatus</i>		Yes	Very rare, known only from the Firth of Clyde.	Personal notes from Gibson for Scottish Biodiversity List
neither	nemertea	G0037	<i>Ramphogordius sanguineus</i>		Yes	Though supposedly fairly common, with a distribution ranging from Scandinavia to the northern coasts of France, precise distributional data are masked by problems of synonymy. In Scotland known from only a single location.	Personal notes from Gibson for Scottish Biodiversity List
neither	nemertea	G0133	<i>Tetrastemma robertianae</i>		Yes	Rarely recorded, from Atlantic coasts, in Scotland, but with an apparent range extending from Scandinavia to England. Not common.	Personal notes from Gibson for Scottish Biodiversity List
neither	nemertea	G0134	<i>Tetrastemma vermiculus</i>		Yes	An inadequately described species, though fairly commonly reported from the North Sea coasts of Scotland; also recorded from the Bay of Fundy eastwards to the Mediterranean. Until such time as the species is adequately redescribed it should probably be included on any conservation list.	Personal notes from Gibson for Scottish Biodiversity List

BAP/ NIMF	Marine group name	MCS (1997) biocode	Taxon	Common name	Occurs in Scotland	Additional comments	Source for establishing if present in Scottish territorial waters
neither	nemertea	G0031	<i>Tubulanus linearis</i>		Yes	Not common, in Scotland recorded from St Andrews and the western Isles, elsewhere occasionally reported from the Atlantic coast of Eire, the south-west coast of England and from locations on French and Italian coasts.	Personal notes from Gibson for Scottish Biodiversity List
both	osteichthyes (bony fish)	ZG0031	<i>Alosa alosa</i>	Allis Shad	Yes	Hydrobiologia, Volume 534, 2005 , pp. 205	A Lyndon; MarLIN; EurOBIS distribution records
both	osteichthyes (bony fish)	ZG0032	<i>Alosa fallax</i>	Twaite Shad	Yes	Hydrobiologia, Volume 534, 2005 , pp. 205	A Lyndon; Whitehead <i>et al</i> (eds), 1984-6
both	osteichthyes (bony fish)	ZG0443	<i>Ammodytes marinus</i>	Lesser Sandeel	Yes		A Lyndon; MarLIN; EurOBIS distribution records
neither	osteichthyes (bony fish)	ZG0444	<i>Ammodytes tobianus</i>	Sand-eel	Yes		A Lyndon; MarLIN; EurOBIS distribution records
both	osteichthyes (bony fish)	ZG0011	<i>Anguilla anguilla</i>	European eel	Yes	widely distributed	A Lyndon; MarLIN; EurOBIS distribution records
both	osteichthyes (bony fish)	ZG0491	<i>Aphanopus carbo</i>	Black Scabbardfish	Yes	Usually deep water. Only a few records west of Scotland (see MarLIN website). Fisheries in adjacent international waters	A Lyndon; EurOBIS distribution records
NIMF	osteichthyes (bony fish)	ZG0084	<i>Apletodon dentatus*</i>	Small headed clingfish	Yes	Loch Creran	A Lyndon; Whitehead <i>et al</i> (eds), 1984-6
NIMF	osteichthyes (bony fish)	ZG0057	<i>Argentina silus*</i>	Great silver smelt	Yes	Several records west of Scotland (MarLIN)	A Lyndon; Whitehead <i>et al</i> (eds), 1984-6
both	osteichthyes (bony fish)	ZG0109	<i>Brosme brosme</i>	Tusk	Yes	Northern and Western Isles	A Lyndon
both	osteichthyes (bony fish)	ZG0034	<i>Clupea harengus</i>	Atlantic herring	Yes		A Lyndon; Whitehead <i>et al</i> (eds), 1984-6
BAP	osteichthyes (bony fish)	(ZG0044)	<i>Coregonus albula</i>	Vendace	Yes	Reintroduced population in Loch Skene (Dumfries & Galloway)	A Lyndon; Whitehead <i>et al</i> (eds), 1984-6

BAP/ NIMF	Marine group name	MCS (1997) biocode	Taxon	Common name	Occurs in Scotland	Additional comments	Source for establishing if present in Scottish territorial waters
both	osteichthyes (bony fish)	ZG0045	<i>Coregonus lavaretus</i>	Whitefish (Powan, Gwyniad or Schelly)	Yes	Present Loch Lomond & Loch Eck - vulnerable	A Lyndon; Whitehead <i>et al</i> (eds), 1984-6
both	osteichthyes (bony fish)	ZG0157	<i>Coryphaenoides rupestris</i>	Roundnose grenadier	Yes	Deep water, continental slope	A Lyndon
both	osteichthyes (bony fish)	ZG0116	<i>Gadus morhua</i>	Cod	Yes		A Lyndon
both	osteichthyes (bony fish)	(ZG023 8)	<i>Hippocampus guttulatus</i>	Long snouted seahorse	Yes	Orkney & Shetland (MarLIN website)	A Lyndon; MarLIN; EurOBIS distribution records
BAP	osteichthyes (bony fish)	ZG0570	<i>Hippoglossus hippoglossus</i>	Atlantic halibut	Yes		A Lyndon; Whitehead <i>et al</i> (eds), 1984-6
both	osteichthyes (bony fish)	(ZG020 4)	<i>Hoplostethus atlanticus</i>	Orange roughy	Possibly	Anton Dohrn sea mount	A Lyndon; EurOBIS distribution records
NIMF	osteichthyes (bony fish)	ZG0088	<i>Lepadogaster candollei*</i>	Clingfish	Yes	Frequent in Loch Creran	A Lyndon; EurOBIS distribution records; Whitehead <i>et al</i> (eds), 1984-6
both	osteichthyes (bony fish)	ZG0094	<i>Lophius piscatorius</i>	Sea monkfish	Yes	Widespread	A Lyndon; Whitehead <i>et al</i> (eds), 1984-6
NIMF	osteichthyes (bony fish)	ZG0161	<i>Macrourus berglax*</i>	Roughhead grenadier	Yes	Deep water, continental slope	A Lyndon; EurOBIS distribution records
NIMF	osteichthyes (bony fish)	ZG0159	<i>Malacocephalus laevis</i>	Softhead rat- tail	Yes	Deep water, continental slope	A Lyndon
both	osteichthyes (bony fish)	ZG0123	<i>Merlangius merlangus</i>	Whiting	Yes		A Lyndon
both	osteichthyes (bony fish)	ZG0149	<i>Merluccius merluccius</i>	European hake	Yes		A Lyndon
both	osteichthyes (bony fish)	ZG0125	<i>Micromesistius poutassou</i>	Blue whiting	Yes	Usually in deeper water/continental slope	A Lyndon
both	osteichthyes (bony fish)	ZG0127	<i>Molva dypterygia</i>	Blue Ling	Yes	Continental slope - apparent decline owing to fishery targetting spawning aggregations	A Lyndon

BAP/ NIMF	Marine group name	MCS (1997) biocode	Taxon	Common name	Occurs in Scotland	Additional comments	Source for establishing if present in Scottish territorial waters
both	osteichthyes (bony fish)	ZG0129	<i>Molva molva</i>	Ling	Yes		A Lyndon
NIMF	osteichthyes (bony fish)	ZG0022	<i>Nemichthys scolopaceus</i>	Snipe eel	Possibly	Deep water, possibly within 200 nm, some recent records right on edge of this (MarLIN)	A Lyndon; EurOBIS distribution records
both	osteichthyes (bony fish)	ZG0054	<i>Osmerus eperlanus</i>	Smelt (Sparling)	Yes	3 populations - Cree, Forth and Tay. Cree is isolated and therefore more vulnerable	A Lyndon; Whitehead <i>et al</i> (eds), 1984-6
both	osteichthyes (bony fish)	ZG0578	<i>Pleuronectes platessa</i>	Plaice	Yes		A Lyndon; Whitehead <i>et al</i> (eds), 1984-6
both	osteichthyes (bony fish)	ZG0136	<i>Pollachius virens</i>	Saithe	Yes		A Lyndon
neither	osteichthyes (bony fish)	ZG0478	<i>Pomatoschistus microps</i>	Common Goby	Yes	Principally estuaries sea lochs and saltmarshes	A Lyndon; Whitehead <i>et al</i> (eds), 1984-6
NIMF	osteichthyes (bony fish)	ZG0479	<i>Pomatoschistus minutus</i>	Sand goby	Yes		A Lyndon; Whitehead <i>et al</i> (eds), 1984-6
both	osteichthyes (bony fish)	ZG0580	<i>Reinhardtius hippoglossoides</i>	Greenland halibut	Yes	West Shetland	A Lyndon; Whitehead <i>et al</i> (eds), 1984-6
both	osteichthyes (bony fish)	ZG0050	<i>Salmo salar</i>	Atlantic salmon	Yes		A Lyndon; Whitehead <i>et al</i> (eds), 1984-6
BAP	osteichthyes (bony fish)	ZG0051	<i>Salmo trutta</i>	Brown/Sea trout	Yes		A Lyndon; Whitehead <i>et al</i> (eds), 1984-6
BAP	osteichthyes (bony fish)	(ZG0043)	<i>Salvelinus alpinus</i>	Arctic charr	Yes	Widespread in Highlands and some islands. Orkney (Hoy) population extinct.	A Lyndon; Whitehead <i>et al</i> (eds), 1984-6
both	osteichthyes (bony fish)	ZG0511	<i>Scomber scombrus</i>	Atlantic mackerel	Yes		A Lyndon; EurOBIS distribution records
BAP	osteichthyes (bony fish)	ZG0257	<i>Sebastes viviparus</i>	Norway haddock	Yes		A Lyndon; Whitehead <i>et al</i> (eds), 1984-6
both	osteichthyes (bony fish)	ZG0591	<i>Solea solea</i> ( <i>Solea vulgaris</i> )	Sole	Yes		A Lyndon; Whitehead <i>et al</i> (eds), 1984-6
both	osteichthyes (bony fish)	ZG0516	<i>Thunnus thynnus</i>	Blue-fin tuna	Possibly	No recent records - formerly present in North Sea. Now an occasional vagrant?	A Lyndon

BAP/ NIMF	Marine group name	MCS (1997) biocode	Taxon	Common name	Occurs in Scotland	Additional comments	Source for establishing if present in Scottish territorial waters
both	osteichthyes (bony fish)	ZG0338	<i>Trachurus trachurus</i>	Horse mackerel	Yes	Seasonally frequent, mainly west coast. Post-larvae sometimes seen inshore	A Lyndon; EurOBIS distribution records
neither	osteichthyes (bony fish)	ZG0142	<i>Trisopterus esmarkii</i>	Norway pout	Yes		A Lyndon
NIMF	pogonophora	M0012	<i>Siboglinum holmei</i>		Don't know	almost certainly under-recorded; very difficult to distinguish between Siboglinum spp.	T Worsfold; Hayward & Ryland, 1990
NIMF	porifera	C0539	<i>Axinella damicornis</i>	Sponge	Yes		MarBEF, Encyclopedia of Marine Life
NIMF	porifera	C1132	<i>Clathria barleei</i>		Yes	Scottish west coast, Rockall	MarBEF, Encyclopedia of Marine Life
NIMF	porifera	C1287	<i>Eurypon clavatum</i>		Yes		MarBEF
NIMF	porifera	C0284	<i>Macandrewia azorica</i>		Yes	nw scotland	MarBEF
NIMF	porifera	C0723	<i>Mycale cf. contarenii</i>		Probably		MarBEF, Encyclopedia of Marine Life
NIMF	porifera	C0733	<i>Mycale similaris</i>		Yes	Sound of Jura	MarBEF, Encyclopedia of Marine Life
NIMF	porifera	C1087	<i>Myxilla perspinosa</i>		Yes	rockall	MarBEF
NIMF	porifera	C0577	<i>Phakellia ventilabrum</i>		Yes	west coast	MarBEF, Encyclopedia of Marine Life
NIMF	porifera	C0366	<i>Quasillina brevis</i>		Yes	northern species	MarBEF
NIMF	porifera	C0973	<i>Spanioplon armaturum</i>		Yes	St Kilda	MarBEF, Encyclopedia of Marine Life
NIMF	porifera	C0374	<i>Spinularia spinularia</i>		Yes	Shetland	MarBEF
NIMF	porifera	C1682	<i>Spongionella pulchella</i>		Yes	northern species	MarBEF
neither	porifera	C0206	<i>Stelletta grubii</i>	Sponge	Yes	Shetland southwards	MarBEF, Encyclopedia of Marine Life



BAP/ NIMF	Marine group name	MCS (1997) biocode	Taxon	Common name	Occurs in Scotland	Additional comments	Source for establishing if present in Scottish territorial waters
neither	porifera	C0216	<i>Stryphnus ponderosus</i>		Yes	widespread	MarBEF
NIMF	porifera	C0099	<i>Sycandra utriculus</i>		Yes	northern species, southern limit N of Scotland	MarBEF, Encyclopedia of Marine Life
both	reptilia (turtle)	ZI0015	<i>Dermochelys coriacea</i>	Leatherback turtle	Yes	endangered	G Swinney; <a href="http://www.nesbiodiversity.org.uk/turtles.htm">www.nesbiodiversity.org.uk/turtles.htm</a> ; Iverson, 1992
NIMF	sipuncula	N0026	<i>Nephasoma rimicola</i>	sipunculan worm	Don't know	almost certainly under-recorded; very difficult to distinguish between <i>Nephasoma</i> spp.	T Worsfold; Gibbs, 2001
NIMF	tunicata	ZD0074	<i>Diazona violacea</i> (Corrected name: <i>Diazona violacea</i> )	Sea squirt	Yes	quite common in west Scotland	<a href="http://www.habitas.org.uk/marinelife/species.asp?item=ZD1230">www.habitas.org.uk/marinelife/species.asp?item=ZD1230</a> ; Hansson, 1998
NIMF	tunicata	ZD0063	<i>Leptoclinides faeroensis</i>	Sea squirt	Yes		NBN Gateway
neither	tunicata	ZD0153	<i>Molgula oculata</i>	Sea squirt	Yes		Millar, 1970; <a href="http://www.habitas.org.uk/marinelife/species.asp?item=ZD2580">http://www.habitas.org.uk/marinelife/species.asp?item=ZD2580</a> ; Hansson, 1998
NIMF	tunicata	ZD0095	<i>Phallusia mammillata</i> **	Sea squirt	Yes		No - Millar, 1970; <a href="http://www.habitas.org.uk/marinelife/species.asp?item=ZD1590">http://www.habitas.org.uk/marinelife/species.asp?item=ZD1590</a> : Yes - Hansson, 1998; NBN Gateway
NIMF	tunicata	ZD0139	<i>Pyura microcosmus</i>	Sea squirt	Yes	common	<a href="http://www.habitas.org.uk/marinelife/species.asp?item=ZD2400">http://www.habitas.org.uk/marinelife/species.asp?item=ZD2400</a>
both	tunicata	ZD0106	<i>Styela gelatinosa</i>	Loch Goil sea squirt	Yes		Hansson, 1998
NIMF	tunicata	ZD0025	<i>Synoicum incrustatum</i>	Sea squirt	Yes		NBN Gateway; <a href="http://www.habitas.org.uk/marinelife/species.asp?item=ZD400">www.habitas.org.uk/marinelife/species.asp?item=ZD400</a>

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## Appendix 2.2 Stage 2 - habitats list as received from National Museums of Scotland.

Habitats listed under existing conservation mechanisms that occur in Scottish territorial waters. Source of records: JNCC database and CMH personal knowledge.

Assigned landscape-scale unit (main)	Assigned landscape-scale unit (additional)	Assigned habitat	Assigned community	Common name/biotope name	Biotope code
Open coast		Sublittoral fringe exposed rock	Alaria esculenta forest	<i>Alaria esculenta</i> on exposed sublittoral fringe bedrock	IR.HIR.KFaR.Ala
Open coast		Sublittoral fringe exposed rock	Alaria esculenta forest	<i>Alaria esculenta</i> forest with dense anemones and crustose sponges on extremely exposed infralittoral bedrock	IR.HIR.KFaR.AlaAnCrSp
Open coast	Sea lochs; Sounds	Infralittoral mixed sediment	Algae on mobile sediments	<i>Laminaria saccharina</i> , <i>Chorda filum</i> and dense red seaweeds on shallow unstable infralittoral boulders or cobbles	IR.HIR.KSed.LsacChoR
Sounds	Sea lochs	Infralittoral mixed sediment	Algae on mobile sediments	<i>Halidrys siliquosa</i> and mixed kelps on tide-swept infralittoral rock with coarse sediment	IR.HIR.KSed.XKHal
Sounds	Open coast; sea lochs	Infralittoral mixed sediment	Algae on mobile sediments	<i>Laminaria hyperborea</i> on tide-swept, infralittoral mixed substrata.	IR.MIR.KR.LhypTX
Generally distributed		Infralittoral sediment	Algae on sediment	Kelp and seaweed communities on sublittoral sediment	SS.SMp.KSwSS
Sea lochs	Lagoon	Reduced or Variable salinity	Algal communities in lagoons or variable salinity	<i>Laminaria saccharina</i> with <i>Phyllophora</i> spp. and filamentous green seaweeds on variable or reduced salinity infralittoral rock	IR.LIR.KVS.LsacPhyVS
Lagoon	Sea lochs	Reduced or Variable salinity	Algal communities in lagoons or variable salinity	Submerged fucoids, green or red seaweeds (low salinity infralittoral rock)	IR.LIR.Lag

Assigned landscape-scale unit (main)	Assigned landscape-scale unit (additional)	Assigned habitat	Assigned community	Common name/biotope name	Biotope code
Sea lochs	Lagoon	Reduced or Variable salinity	Algal communities in lagoons or variable salinity	Kelp in variable or reduced salinity	IR.LIR.KVS
Lagoon	Sea lochs	Reduced or Variable salinity	Algal communities in lagoons or variable salinity	Fucoids in variable salinity	LR.LLR.FVS
Lagoon	Sea lochs	Reduced or Variable salinity	Algal communities in lagoons or variable salinity	<i>Ascophyllum nodosum</i> and <i>Fucus vesiculosus</i> on variable salinity mid eulittoral rock	LR.LLR.FVS.AscVS
Lagoon	Sea lochs; Estuaries	Reduced or Variable salinity	Algal communities in lagoons or variable salinity	<i>Fucus ceranoides</i> on reduced salinity eulittoral rock	LR.LLR.FVS.Fcer
Lagoon	Sea lochs; Estuaries	Reduced or Variable salinity	Algal communities in lagoons or variable salinity	<i>Fucus serratus</i> and large <i>Mytilus edulis</i> on variable salinity lower eulittoral rock	LR.LLR.FVS.FserVS
Lagoon	Sea lochs; Estuaries	Reduced or Variable salinity	Algal communities in lagoons or variable salinity	<i>Fucus vesiculosus</i> on variable salinity mid eulittoral boulders and stable mixed substrata	LR.LLR.FVS.FvesVS
Open coast		Wave surged rock	Algal turf on wave surged rock	Foliose seaweeds and coralline crusts in surge gully entrances	IR.FIR.SG.FoSvCC
Sea lochs	Lagoon	Circalittoral mud	Anoxic sublittoral mud	<i>Beggiatoa</i> spp. on anoxic sublittoral mud	SS.SMu.IFiMu.Beg
Embayment		Littoral mixed sediment	Bivalve-dominated littoral mixed sediment	Cirratulids and <i>Cerastoderma edule</i> in littoral mixed sediment	LS.LMx.Mx.CirCer
Generally distributed		Littoral mud/sand	Bivalve-dominated littoral mixed sediment	Polychaete / bivalve dominated muddy sand shores	LS.LSa.MuSa
Offshore		Circalittoral offshore mixed sediment	Bivalves &/or polychaetes in circalittoral mixed sediment	Polychaete-rich deep <i>Venus</i> community in offshore gravelly muddy sand	SS.SMx.OMx.PoVen

Assigned landscape-scale unit (main)	Assigned landscape-scale unit (additional)	Assigned habitat	Assigned community	Common name/biotope name	Biotope code
Open coast	Sea lochs	Circalittoral mixed sediment	Bivalves &/or polychaetes in circalittoral mixed sediment	<i>Mysella bidentata</i> and <i>Thyasira</i> spp. in circalittoral muddy mixed sediment	SS.SMx.CMx.MysThyMx
Open coast	Sea lochs	Circalittoral mixed sediment	Bivalves &/or polychaetes in circalittoral mixed sediment	<i>Abra alba</i> and <i>Nucula nitidosa</i> in circalittoral muddy sand or slightly mixed sediment	SS.SSa.CMuSa.AalbNuc
Sea lochs	Open coast	Infralittoral gravel	Bivalves in infralittoral gravel	<i>Moerella</i> spp. with venerid bivalves in infralittoral gravelly sand	SS.SCS.ICS.MoeVen
Sea lochs		Circalittoral sheltered rock	Brachiopod communities	<i>Neocrania anomala</i> and <i>Protanthea simplex</i> on very wave-sheltered circalittoral rock	CR.LCR.BrAs.NeoPro.FS
Sea lochs		Circalittoral sheltered rock	Brachiopod communities	<i>Neocrania anomala</i> , <i>Dendrodoa grossularia</i> and <i>Sarcodictyon roseum</i> on variable salinity circalittoral rock	CR.LCR.BrAs.NeoPro.VS
Open coast	Sea lochs; Sounds	Epifauna on circalittoral mixed sediment	brittlestar beds	<i>Ophiothrix fragilis</i> and/or <i>Ophiocomina nigra</i> brittlestar beds on sublittoral mixed sediment	SS.SMx.CMx.OphMx
Offshore		carbonate mounds	carbonate mounds	Carbonate mounds	No code
Sea lochs	Open coast; Embayment	Epifauna on circalittoral sheltered mixed sediment	Cerianthus on mixed sediment	<i>Cerianthus lloydii</i> and other burrowing anemones in circalittoral muddy mixed sediment	SS.SMx.CMx.CIlloMx
Sea lochs	Sounds; Open coast; Embayment	Circalittoral mixed sediment	Cerianthus on mixed sediment	<i>Cerianthus lloydii</i> with <i>Nemertesia</i> spp. and other hydroids in circalittoral muddy mixed sediment	SS.SMx.CMx.CIlloMx.Nem
Open coast	Sea lochs	Circalittoral gravel	Infaunal community in circalittoral gravel	<i>Mediomastus fragilis</i> , <i>Lumbrineris</i> spp. and venerid bivalves in circalittoral coarse sand or gravel	SS.SCS.CCS.MedLumVen

Assigned landscape-scale unit (main)	Assigned landscape-scale unit (additional)	Assigned habitat	Assigned community	Common name/biotope name	Biotope code
Sea lochs	Sounds; Open coast; Embayment	Circalittoral gravel	Surface community on circalittoral gravel	<i>Neopentadactyla mixta</i> in circalittoral shell gravel or coarse sand	SS.SCS.CCS.Nmix
Generally distributed		Circalittoral mixed sediment	Circalittoral mixed sediment	Circalittoral mixed sediment	SS.SMx.CMx
Generally distributed		Circalittoral mud	Circalittoral mud	Circalittoral fine mud	SS.SMu.CFiMu
Generally distributed		Circalittoral mud	Circalittoral mud	Circalittoral sandy mud	SS.SMu.CSaMu
Offshore		Circalittoral mud	Circalittoral mud	Offshore circalittoral mud	SS.SMu.OMu
Offshore		Deep sea reef	Cold-water coral reefs	<i>Cold-water coral reefs / Lophelia pertusa reefs</i>	No code
Open coast		Littoral exposed rock	Communities on littoral exposed rock/boulders	<i>Fucus distichus</i> and <i>Fucus spiralis</i> f. <i>nana</i> on extremely exposed upper shore rock	LR.HLR.FR.Fdis
Open coast	Sounds	Littoral exposed rock	Communities on littoral exposed rock/boulders	<i>Himanthalia elongata</i> and red seaweeds on exposed to moderately exposed lower eulittoral rock	LR.HLR.FR.Him
Open coast	Sea lochs; Sounds	Littoral exposed boulders	Communities on littoral exposed rock/boulders	<i>Fucus serratus</i> and under-boulder fauna on exposed to moderately exposed lower eulittoral boulders	LR.MLR.BF.Fser.Bo
Open coast	Sea lochs; Sounds	Littoral exposed rock	Communities on littoral exposed rock/boulders	<i>Fucus vesiculosus</i> and barnacle mosaics on moderately exposed mid eulittoral rock	LR.MLR.BF.FvesB
Open coast	Sea lochs; Sounds	Littoral exposed rock	Communities on littoral exposed rock/boulders	<i>Mytilus edulis</i> and <i>Fucus vesiculosus</i> on moderately exposed mid eulittoral rock	LR.MLR.MusF.MytFves
Offshore		Deep sea sediment	Deep sea mud	Offshore Deep sediment plains, megaripple fields, banks and mounds	No code

Assigned landscape-scale unit (main)	Assigned landscape-scale unit (additional)	Assigned habitat	Assigned community	Common name/biotope name	Biotope code
Offshore		Deep sea sediment	Deep sea mud	Mud habitats in deep water	No code
Offshore		Deep sea reef	Deep sea reef	Seamounts	No code
Offshore		Deep sea reef	Deep sea reef	deep water reefs	No code
Offshore		Deep sea reef	Deep sea reef	Deep-sea sponge aggregations	No code
Open coast		Circalittoral open coast rock	Deep sponge communities	<i>Phakellia ventilabrum</i> and Axinellid sponges on deep, wave-exposed circalittoral rock	CR.HCR.DpSp.PhaAxi
Sea lochs		Circalittoral mud	Echinoderms in circalittoral mud	<i>Brissopsis lyrifera</i> and <i>Amphiura chiajei</i> in circalittoral mud	SS.SMu.CFiMu.BlyrAchi
Sea lochs		Reduced or Variable salinity	Egg wrack ( <i>Ascophyllum nodosum</i> ecad mackayi)	Egg wrack ( <i>Ascophyllum nodosum</i> ecad mackayi)	LR.LLR.FVS.Ascmac
Lagoon	Sea lochs	Reduced or Variable salinity	Epifaunal communities on rock in lagoons or variable salinity	Faunal communities on variable or reduced salinity infralittoral rock	IR.LIR.IFaVS
Estuaries		Reduced or Variable salinity	Estuarine rock communities	Estuarine rocky habitats	No code
Estuaries		Reduced or Variable salinity	Estuarine sediment communities	Estuarine sediment habitats	No code
Open coast		Wave surged rock	Faunal turf on wave surged rock	Sponges, cup corals and anthozoans on shaded or overhanging circalittoral rock	CR.FCR.Cv.SpCup
Open coast		Wave surged rock	Faunal turf on wave surged rock	Anemones, including <i>Corynactis viridis</i> , crustose sponges and colonial ascidians on very exposed or wave surged vertical infralittoral rock	IR.FIR.SG.CrSpAsAn



Assigned landscape-scale unit (main)	Assigned landscape-scale unit (additional)	Assigned habitat	Assigned community	Common name/biotope name	Biotope code
Open coast		Wave surged rock	Faunal turf on wave surged rock	Crustose sponges and colonial ascidians with <i>Dendrodoa grossularia</i> or barnacles on wave-surged infralittoral rock	IR.FIR.SG.CrSpAsDenB
Open coast		Wave surged rock	Faunal turf on wave surged rock	<i>Dendrodoa grossularia</i> and <i>Clathrina coriacea</i> on wave-surged vertical infralittoral rock	IR.FIR.SG.DenCcor
Sounds	Sea lochs; Open coast	Littoral tideswept rock	Fucoid communities in tide swept conditions	Fucoids in tide-swept conditions	LR.HLR.FT
Sounds	Sea lochs; Open coast	Littoral tideswept mixed sediment	Fucoid communities in tide swept conditions	<i>Fucus serratus</i> with sponges, ascidians and red seaweeds on tide-swept lower eulittoral mixed substrata	LR.HLR.FT.FserTX
Sea lochs	Embayment	Littoral sheltered rock	Fucoid communities on sheltered rock	<i>Ascophyllum nodosum</i> on very sheltered mid eulittoral rock	LR.LLR.F.Asc
Sea lochs	Open coast; Embayment	Littoral sheltered rock	Fucoid communities on sheltered rock	<i>Fucus spiralis</i> on sheltered upper eulittoral rock	LR.LLR.F.Fspi
Sounds	Open coast; sea lochs	Epifauna on circalittoral tide swept mixed sediment	Hydroids & bryozoans on tide swept mixed sediment	<i>Flustra foliacea</i> and <i>Hydrallmania falcata</i> on tide-swept circalittoral mixed sediment	SS.SMx.CMx.FluHyd
Estuaries		Reduced or Variable salinity	Infaunal communities in reduced salinity shallow mud	<i>Capitella capitata</i> in enriched sublittoral muddy sediments	SS.SMu.ISaMu.Cap
Lagoon		Reduced or Variable salinity	Infaunal communities in reduced salinity shallow mud	Sublittoral mud in low or reduced salinity (lagoons)	SS.SMu.SMuLS

Assigned landscape-scale unit (main)	Assigned landscape-scale unit (additional)	Assigned habitat	Assigned community	Common name/biotope name	Biotope code
Estuaries	Lagoon	Reduced or Variable salinity	Infaunal communities in reduced salinity shallow mud	<i>Capitella capitata</i> and <i>Tubificoides</i> spp. in reduced salinity infralittoral muddy sediment	SS.SMu.SMuVS.CapTubi
Estuaries		Reduced or Variable salinity	Infaunal communities in reduced salinity shallow mud	Oligochaetes in variable or reduced salinity infralittoral muddy sediment	SS.SMu.SMuVS.OIVS
Sea lochs		Infralittoral mixed sediment	Infaunal community in infralittoral mixed sediment	<i>Venerupis senegalensis</i> , <i>Amphipholis squamata</i> and <i>Apseudes latreilli</i> in infralittoral mixed sediment	SS.SMx.IMx.VsenAsquAps
Sea lochs		Infralittoral mud/sand	Infaunal community in infralittoral mud/ sand	<i>Melinna palmata</i> with <i>Magelona</i> spp. and <i>Thyasira</i> spp. in infralittoral sandy mud	SS.SMu.ISaMu.MelMagThy
Sea lochs		Infralittoral mud/sand	Infaunal community in infralittoral mud/ sand	<i>Spisula subtruncata</i> and <i>Nephtys hombergii</i> in shallow muddy sand	SS.SSa.IMuSa.SsubNhom
Lagoon		Reduced or Variable salinity	Infaunal community in lagoonal mixed sediment	Sublittoral mixed sediment in low or reduced salinity (lagoons)	SS.SMx.SMxLS
Lagoon	Sea lochs	Reduced or Variable salinity	Infaunal community in lagoonal mixed sediment	<i>Apelochaeta</i> spp. and <i>Polydora</i> spp. in variable salinity infralittoral mixed sediment	SS.SMx.SMxVS.AphPol
Generally distributed		Sublittoral gravel	Surface community on sublittoral gravel and/or Infaunal community in sublittoral gravel	Sublittoral coarse sediment (unstable cobbles and pebbles, gravels and coarse sands)	SS.SCS

Assigned landscape-scale unit (main)	Assigned landscape-scale unit (additional)	Assigned habitat	Assigned community	Common name/biotope name	Biotope code
Generally distributed		Infralittoral mixed sediment	Surface community on infralittoral mixed sediment <i>and/or</i> Infaunal community on infralittoral mixed sediment	Infralittoral mixed sediment	SS.SMx.IMx
Open coast		Infralittoral tide swept rock	Kelp forest with rich understory	<i>Laminaria hyperborea</i> forest with a faunal cushion (sponges and polyclinids) and foliose red seaweeds on very exposed upper infralittoral rock	IR.HIR.KFaR.LhypFa
Sounds	Open coast; sea lochs	Infralittoral tide swept rock	Kelp forest with rich understory	<i>Laminaria hyperborea</i> on tide-swept, infralittoral rock	IR.MIR.KR.LhypT
Sounds	Open coast; sea lochs	Infralittoral tide swept rock	Kelp forest with rich understory	Kelp and seaweed communities in tide-swept sheltered conditions	IR.MIR.KT
Open coast	Sea lochs	Sublittoral fringe boulders	<i>Laminaria digitata</i> forest	<i>Laminaria digitata</i> and under-boulder fauna on sublittoral fringe boulders	IR.MIR.KR.Ldig.Bo
Sea lochs	Sounds	Biogenic reef	<i>Limaria</i> beds	<i>Limaria hians</i> beds in tide-swept sublittoral muddy mixed sediment	SS.SMx.IMx.Lim
Generally distributed		Littoral boulders	Littoral boulders	Intertidal boulder communities	No code
Open coast		Chalk	Littoral chalk community	Littoral chalk communities/ intertidal chalk	No code
Open coast		Marine caves	Littoral marine caves	Littoral caves and overhangs	LR.FLR.CvOv
Open coast		Marine caves	Littoral marine caves	<i>Audouinella purpurea</i> and <i>Cladophora rupestris</i> on upper to mid-shore cave walls	LR.FLR.CvOv.AudCla

Assigned landscape-scale unit (main)	Assigned landscape-scale unit (additional)	Assigned habitat	Assigned community	Common name/biotope name	Biotope code
Open coast		Marine caves	Littoral marine caves	Barren and/or boulder-scoured littoral cave walls and floors	LR.FLR.CvOv.BarCv
Open coast		Marine caves	Littoral marine caves	Faunal crusts on wave-surged littoral cave walls	LR.FLR.CvOv.FaCr
Open coast		Marine caves	Littoral marine caves	Green algal films on upper and mid-shore cave walls and ceilings	LR.FLR.CvOv.GCv
Open coast		Marine caves	Littoral marine caves	Sparse fauna (barnacles and spirorbids) on sand/pebble-scoured rock in littoral caves	LR.FLR.CvOv.ScrFa
Open coast		Marine caves	Littoral marine caves	Sponges, bryozoans and ascidians on deeply overhanging lower shore bedrock or caves	LR.FLR.CvOv.SpByAs
Open coast		Marine caves	Littoral marine caves	<i>Verrucaria mucosa</i> and/or <i>Hildenbrandia rubra</i> on upper to mid shore cave walls	LR.FLR.CvOv.VmuchHil
Open coast		Marine caves	Littoral marine caves Sublittoral marine caves	Submerged and partially submerged sea caves	No code
Generally distributed		Littoral mixed sediment	Littoral mixed sediment	Littoral mixed sediment	LS.LMx
Estuaries	Sea lochs; embayment	Littoral mud	Littoral mud	Littoral mud	LS.LMu
Generally distributed		Littoral mud	Littoral mud	Intertidal mudflats	LS.LMu
Generally distributed		Littoral mud	Littoral mud	Mudflat	LS.LMu
Generally distributed		Littoral mud/sand	Littoral mud Littoral sand	Mudflats and sandflats not covered by seawater at low tide	LS.LSa LS.LMu
Generally distributed		Littoral sand	Littoral sand	Sandflat	LS.LSa

Assigned landscape-scale unit (main)	Assigned landscape-scale unit (additional)	Assigned habitat	Assigned community	Common name/biotope name	Biotope code
Estuaries	Sea lochs; embayment	Littoral sheltered mud/sand	Littoral sea grass beds	<i>Zostera noltii</i> beds in littoral muddy sand	LS.LMp.LSgr.Znol
Sea lochs	Sounds; Open coast; Embayment	Littoral sheltered mud/sand	Littoral sea grass beds Sublittoral seagrass beds	<i>Zostera marina/angustifolia</i> beds on lower shore or infralittoral clean or muddy sand	SS.SMp.SSgr.Zmar
Sea lochs	Sounds; Open coast; Embayment	Infralittoral gravel	Maerl bed	Maerl beds	SS.SMp
Sea lochs		Infralittoral gravel	Maerl bed	<i>Lithothamnion glaciale</i> maerl beds in tide-swept variable salinity infralittoral gravel	SS.SMp.Mrl.Lgla
Sea lochs	Sounds; Open coast; Embayment	Infralittoral gravel	Maerl bed	<i>Phymatolithon calcareum</i> maerl beds in infralittoral clean gravel or coarse sand	SS.SMp.Mrl.Pcal
Sea lochs	Sounds; Open coast; Embayment	Infralittoral gravel	Maerl bed	<i>Phymatolithon calcareum</i> maerl beds with <i>Neopentadactyla mixta</i> and other echinoderms in deeper infralittoral clean gravel or coarse sand	SS.SMp.Mrl.Pcal.Nmix
Sea lochs	Sounds; Open coast; Embayment	Infralittoral gravel	Maerl bed	<i>Phymatolithon calcareum</i> maerl beds with red seaweeds in shallow infralittoral clean gravel or coarse sand	SS.SMp.Mrl.Pcal.R
Sea lochs	Lagoon	Infralittoral mixed sediment	Surface community on infralittoral mixed sediment	<i>Sabella pavonina</i> with sponges and anemones on infralittoral mixed sediment	SS.SMx.IMx.SpavSpAn
Sea lochs		Infralittoral mud	Surface community on infralittoral mud	<i>Philine aperta</i> and <i>Virgularia mirabilis</i> in soft stable infralittoral mud	SS.SMu.IFiMu.PhiVir
Sounds		Circalittoral tide swept	Mixed faunal turf in tide swept conditions	Very tide-swept faunal communities	CR.HCR.FaT

Assigned landscape-scale unit (main)	Assigned landscape-scale unit (additional)	Assigned habitat	Assigned community	Common name/biotope name	Biotope code
Generally distributed		Circalittoral rock	Mixed faunal turf on circalittoral rock	Fragile sponge & anthozoan communities on subtidal rocky habitats	No code
Sounds		Circalittoral tide swept rock	Mixed faunal turf on tide swept rock	Bryozoan turf and erect sponges on tide-swept circalittoral rock	CR.HCR.XFa.ByErSp
Sounds		Circalittoral tide swept rock	Mixed faunal turf on tide swept rock	Mixed turf of bryozoans and erect sponges with <i>Sagartia elegans</i> on tide-swept circalittoral rock	CR.HCR.XFa.ByErSp.Sag
Sounds		Circalittoral tide swept rock	Mixed faunal turf on tide swept rock	<i>Corynactis viridis</i> and a mixed turf of crisiids, <i>Bugula</i> , <i>Scrupocellaria</i> , and <i>Cellaria</i> on moderately tide-swept exposed circalittoral rock	CR.HCR.XFa.CvirCri
Sounds		Circalittoral tide swept rock	Mixed faunal turf on tide swept rock	<i>Flustra foliacea</i> and colonial ascidians on tide-swept moderately wave-exposed circalittoral rock	CR.HCR.XFa.FluCoAs
Sounds		Circalittoral tide swept rock	Mixed faunal turf on tide swept rock	<i>Flustra foliacea</i> , small solitary and colonial ascidians on tide-swept circalittoral bedrock or boulders	CR.HCR.XFa.FluCoAs.SmAs
Sounds		Circalittoral tide swept rock	Mixed faunal turf on tide swept rock	<i>Alcyonium digitatum</i> with <i>Securiflustra securifrons</i> on tide-swept moderately wave-exposed circalittoral rock	CR.MCR.EcCr.FaAlCr.Sec
Open coast		Circalittoral open coast rock	Mixed faunal turf with seafans	Mixed turf of hydroids and large ascidians with <i>Swiftia pallida</i> and <i>Caryophyllia smithii</i> on weakly tide-swept circalittoral rock	CR.HCR.XFa.SwiLgAs
Open Coast	Sea lochs; Sounds	Circalittoral open coast rock	Mixed faunal turf with seafans	Northern sea fan communities	CR.HCR.XFa.SwiLgAs CR.MCR.EcCr.CarSwi

Assigned landscape-scale unit (main)	Assigned landscape-scale unit (additional)	Assigned habitat	Assigned community	Common name/biotope name	Biotope code
Open coast		Circalittoral open coast rock	Mixed faunal turf with seafans	<i>Caryophyllia smithii</i> and <i>Swiftia pallida</i> on circalittoral rock	CR.MCR.EcCr.CarSwi
Open coast		Circalittoral open coast rock	Mixed faunal turf with seafans	<i>Caryophyllia smithii</i> , <i>Swiftia pallida</i> and large solitary ascidians on exposed or moderately exposed circalittoral rock	CR.MCR.EcCr.CarSwi.LgAs
Sea lochs		Epifauna on circalittoral sheltered mixed sediment	<i>Modiolus</i> beds	Sparse <i>Modiolus modiolus</i> , dense <i>Cerianthus lloydii</i> and burrowing holothurians on sheltered circalittoral stones and mixed sediment	SS.SMx.CMx.CIloModHo
Sea lochs	Sounds; Open coast; Embayment	Biogenic reef	<i>Modiolus</i> beds	<i>Modiolus modiolus</i> beds	SS.SBR.SMus.ModT, SS.SBR.SMus.ModMx, SS.SBR.SMus.ModHAs SS.SBR.SMus.ModCvar
Sea lochs	Sounds	Biogenic reef	<i>Modiolus</i> beds	<i>Modiolus modiolus</i> beds with <i>Chlamys varia</i> , sponges, hydroids and bryozoans on slightly tide-swept very sheltered circalittoral mixed substrata	SS.SBR.SMus.ModCvar
Sea lochs		Biogenic reef	<i>Modiolus</i> beds	<i>Modiolus modiolus</i> beds with fine hydroids and large solitary ascidians on very sheltered circalittoral mixed substrata	SS.SBR.SMus.ModHAs
Sounds		Biogenic reef	<i>Modiolus</i> beds	<i>Modiolus modiolus</i> beds on open coast circalittoral mixed sediment	SS.SBR.SMus.ModMx
Sounds	Sea lochs	Biogenic reef	<i>Modiolus</i> beds	<i>Modiolus modiolus</i> beds with hydroids and red seaweeds on tide-swept circalittoral mixed substrata	SS.SBR.SMus.ModT
Generally distributed	Sea lochs; Open coast; sounds	Littoral rock	Mussel and/or barnacle communities	Mussel and/or barnacle communities	LR.HLR.MusB

Assigned landscape-scale unit (main)	Assigned landscape-scale unit (additional)	Assigned habitat	Assigned community	Common name/biotope name	Biotope code
Open coast		Biogenic reef	<i>Mytilus</i> beds	<i>Mytilus edulis</i> beds with hydroids and ascidians on tide-swept exposed to moderately wave-exposed circalittoral rock	CR.MCR.CMus.CMyt
Sea lochs	Lagoon	Biogenic reef	<i>Mytilus</i> beds	<i>Mytilus edulis</i> beds on reduced salinity tide-swept infralittoral rock	IR.LIR.IFaVS.MytRS
Sea lochs	Lagoon	reduced or Variable salinity	<i>Mytilus</i> beds	<i>Mytilus edulis</i> beds on reduced salinity tide-swept infralittoral rock	IR.LIR.IFaVS.MytRS
Sea lochs		Biogenic reef	<i>Mytilus</i> beds	<i>Mytilus edulis</i> beds on littoral mud	LS.LBR.LMus.Myt.Mu
Estuaries		Biogenic reef	<i>Mytilus</i> beds	<i>Mytilus edulis</i> and <i>Fabricia sabella</i> in littoral mixed sediment	LS.LSa.St.MytFab
Sea lochs	Sounds; Open coast; Embayment; Lagoon	Biogenic reef	<i>Mytilus</i> beds	Blue mussel beds	No code
Sea lochs	Sounds; Open coast; Embayment; Lagoon	Biogenic reef	<i>Mytilus</i> beds	Intertidal <i>Mytilus edulis</i> beds on mixed and sandy sediments	No code
Offshore		Circalittoral offshore mixed sediment	Offshore circalittoral mixed sediment	Offshore circalittoral mixed sediment	SS.SMx.OMx
Sea lochs		Infralittoral sheltered mixed sediment	Oyster beds	<i>Ostrea edulis</i> beds on shallow sublittoral muddy mixed sediment	SS.SMx.IMx.Ost
Sea lochs	Lagoon	Peat/Clay	Peat/Clay	Peat and clay exposures	No code
Open coast	Sounds; sea lochs	Rockpools	Rockpools	Coralline crust-dominated shallow eulittoral rockpools	LR.FLR.Rkp.Cor



Assigned landscape-scale unit (main)	Assigned landscape-scale unit (additional)	Assigned habitat	Assigned community	Common name/biotope name	Biotope code
Open coast	Sounds; sea lochs	Rockpools	Rockpools	Fucoids and kelp in deep eulittoral rockpools	LR.FLR.Rkp.FK
Open coast	Sounds; sea lochs	Rockpools	Rockpools	Seaweeds in sediment-floored eulittoral rockpools	LR.FLR.Rkp.SwSed
Estuaries		Biogenic reef	<i>Sabellaria</i> reefs	<i>Sabellaria alveolata</i> reefs	LS.LBR.Sab.Salv
Estuaries		Biogenic reef	<i>Sabellaria</i> reefs	<i>Sabellaria alveolata</i> reefs on sand-abraded eulittoral rock	LS.LBR.Sab.Salv
Sea lochs		Circalittoral mud	Sea pens and burrowing megafauna	Burrowing megafauna and <i>Maxmuelleria lankesteri</i> in circalittoral mud	SS.SMu.CFiMu.MegMax
Sea lochs		Circalittoral mud	Sea pens and burrowing megafauna	Deep burrowed mud with <i>Funiculina</i> and <i>Pachycerianthus</i>	SS.SMu.CFiMu.SpnMeg
Sea lochs	Open coast; Embayment	Circalittoral mud	Sea pens and burrowing megafauna	Sea-pen and burrowing megafauna communities	SS.SMu.CFiMu.SpnMeg
Sea lochs		Biogenic reef	Serpulid reefs	<i>Serpula vermicularis</i> reefs on very sheltered circalittoral muddy sand	SS.SBR.PoR.Ser
Sea lochs		Reduced or Variable salinity	Sponges & hydroids in reduced or variable salinity	<i>Halichondria bowerbanki</i> , <i>Eudendrium arbusculum</i> and <i>Eucratea loricata</i> on reduced salinity tide-swept circalittoral mixed substrata	CR.MCR.CFaVS.HbowEud
Generally distributed		Reef	Sublittoral and littoral rock	Reefs	No code
Open coast		Marine caves	Sublittoral marine caves	Crustose sponges on extremely wave-surged infralittoral cave or gully walls	IR.FIR.SG.CC

Assigned landscape-scale unit (main)	Assigned landscape-scale unit (additional)	Assigned habitat	Assigned community	Common name/biotope name	Biotope code
Open coast		Marine caves	Sublittoral marine caves	Sponges and shade-tolerant red seaweeds on overhanging lower eulittoral bedrock and in cave entrances	LR.FLR.CvOv.SpR
Open coast		Marine caves	Sublittoral marine caves	Sponges, shade-tolerant red seaweeds and <i>Dendrodoa grossularia</i> on wave-surged overhanging lower eulittoral bedrock and caves	LR.FLR.CvOv.SpR.Den
Sea lochs	Embayments ; Estuaries; Lagoons	Sublittoral sand	Sublittoral sea grass beds	Eel grass bed	No code
Lagoons		Reduced or Variable salinity	Sublittoral seagrass beds	<i>Ruppia maritima</i> in reduced salinity infralittoral muddy sand	SS.SMp.SSgr.Rup
Generally distributed		Sublittoral sheltered mixed sediment	Sublittoral sheltered mixed sediment	Sheltered muddy gravels	SS.SCS
Offshore		Submarine structures made by leaking gases	Submarine structures made by leaking gases	Submarine structures made by leaking gases	No code
Sounds	Sea lochs	Tidal rapids	Tide swept communities	Tidal rapids	No code
Sounds	Sea lochs	Tidal rapids	Tide swept communities	Tide-swept channels	No code

## APPENDIX 3 LIST OF DATA WORKBOOKS FOR SPECIES AND HABITAT ASSESSMENTS

Excel Workbook Name
1_HabitatCriteria_Intertidal.xls
2_HabitatCriteria_RockySublittoral.xls
3_HabitatCriteria_SedimentSublittoral.xls
4_HabitatCriteria_DeepSeaorLargerfeatures.xls
5_Plants_nonAlgae_SpeciesCriteria_spreadsheet.xls
6_Algae_SpeciesCriteria_spreadsheet.xls
7_Cnidaria_SpeciesCriteria_spreadsheet.xls
8_Bryozoa_SpeciesCriteria_spreadsheet.xls
9_Crustacea_SpeciesCriteria_spreadsheet.xls
10_Echinodermata_SpeciesCriteria_spreadsheet.xls
11_Fish_SpeciesCriteria_spreadsheet.xls
12_Mammals&Turtles_SpeciesCriteria_spreadsheet.xls
13_MinorPhyla_SpeciesCriteria_spreadsheet.xls
14_Mollusca_SpeciesCriteria_spreadsheet.xls
15_Nemertea_SpeciesCriteria_spreadsheet.xls
16_Porifera_SpeciesCriteria_spreadsheet.xls
17_Tunicata_SpeciesCriteria_spreadsheet.xls

## APPENDIX 4 LIST OF FEATURES POTENTIALLY AFFECTED BY CLIMATE CHANGE

Features on this list were considered as possible passes at some stages of the project. They were moved to this list when it was realised that the main threat to their presence in Scotland lay in the potential effects of climate change.

A range of outcomes could result through climate change, including ocean acidification, ocean warming and sea-level rise. There are two main groups of features included here. Seacaves and biotopes occurring in seacaves may be affected by rising sea levels. The second group consists of northern species which reach their southern limits in the British Isles, often in Scotland, and which may be expected to retreat northwards with warming seas. Some of these species are considered highly representative of northern communities in Scotland, notably the sea urchin *Strongylocentrotus droebachiensis* and the sea cucumber *Cucumaria frondosa* and, although rare, were strong candidates for inclusion on the recommended list.

We recognise the potential effects of climate change as being important. However, in the immediate term, it is thought that implementing specific measures at the level of individual species and habitats is unlikely to be effective in mitigating the probable overriding effects of climate change. Measures implemented as part of SNH's broader climate change programme are likely to be more appropriate. Features under threat from climate change are included here to highlight their importance and with the understanding that these issues might be revisited in the future. Hiscock *et al.* (2001, 2004) discuss the implications of climate change in Scottish waters in considerable detail.

### Sea cave biotopes

Note that changes in sea levels will take place over a long period and other caves will be formed in the interim.

Biotope Name/ Species Common Name	Biotope Code/ Scientific name
Submerged and partially submerged sea caves	No code
Littoral caves & overhangs	LR.FLR.CvOv
<i>Audouinella purpurea</i> and <i>Cladophora rupestris</i> on upper to mid-shore cave walls	LR.FLR.CvOv.AudCla
Barren and/or boulder-scoured littoral cave walls and floors	LR.FLR.CvOv.BarCv
Faunal crusts on wave-surged littoral cave walls	LR.FLR.CvOv.FaCr
Green algal films on upper and mid-shore cave walls and ceilings	LR.FLR.CvOv.GCv
Sparse fauna (barnacles and spirorbids) on sand/pebble-scoured rock in littoral caves	LR.FLR.CvOv.ScrFa

Sponges, bryozoans and ascidians on deeply overhanging lower shore bedrock or caves	LR.FLR.CvOv.SpByAs
Sponges and shade-tolerant red seaweeds on overhanging lower eulittoral bedrock and in cave entrances	LR.FLR.CvOv.SpR
Sponges, shade-tolerant red seaweeds and <i>Dendrodoa grossularia</i> on wave-surged overhanging lower eulittoral bedrock and caves	LR.FLR.CvOv.SpR.Den
<i>Verrucaria mucosa</i> and/or <i>Hildenbrandia rubra</i> on upper to mid shore cave walls	LR.FLR.CvOv.VmucHil

### Northern biotopes and species likely to retreat northwards

Biotope Name/ Species Common Name	Biotope Code/ Scientific name
<i>Fucus distichus</i> and <i>Fucus spiralis</i> f. <i>nana</i> on extremely exposed upper shore rock	LR.HLR.FR.Fdis
Red alga	<i>Tsengia bairdii</i>
Red alga	<i>Schmitzia hiscockiana</i>
Red alga	<i>Callophyllis cristata</i>
Brown alga	<i>Fucus distichus</i>
Olive green wart anemone	<i>Phellia gausapata</i>
Amphipod	<i>Corophium affine</i>
Northern sea urchin	<i>Strongylocentrotus droebachiensis</i>
Rigid cushion star	<i>Hippasteria phrygiana</i>
Northern sea cucumber, sea pudding	<i>Cucumaria frondosa</i>
Bryozoan	<i>Coronopora truncata</i>
Bryozoan	<i>Bugula purpurotincta</i>

## APPENDIX 5 LIST OF FEATURES CONSIDERED TO BE DATA DEFICIENT

Features were defined as data deficient where there was not enough data to make assessments against one or more of the other importance criteria, namely Proportional Importance; Decline/Threat of Decline; Functional Importance; and Rarity. Such features could not pass the importance criteria and were therefore not included on the list of Priority Marine Features. Instead, data deficient features have been recorded in this separate list, so that they may be reviewed for their inclusion on the list of Priority Marine Features as and when new data become available.

The list below does not include data deficient features for which it was possible to assess that Scottish territorial waters are not proportionally important. Such features would not qualify as Priority Marine Features for this reason, regardless of the assessments made against the other importance criteria.

It is recognised that many of the other features considered through this process would benefit from availability of additional data; for example in order to facilitate more detailed interpretation against the criteria or to better understand how conservation action might be implemented. This list does not capture that information, but rather records those species and habitats for which it was felt that the current prioritisation process could not be completed.

Biotope Name/ Species Common Name	Biotope Code/ Scientific name
Very tide-swept faunal communities	CR.HCR.FaT
<i>Neocrania anomala</i> , <i>Dendrodoa grossularia</i> and <i>Sarcodictyon roseum</i> on variable salinity circalittoral rock	CR.LCR.BrAs.NeoPro.VS
<i>Neocrania anomala</i> and <i>Protanthea simplex</i> on very wave-sheltered circalittoral rock	CR.LCR.BrAs.NeoPro/NeoPro.FS
<i>Halichondria bowerbanki</i> , <i>Eudendrium arbusculum</i> and <i>Eucratea loricata</i> on reduced salinity tide-swept circalittoral mixed substrata	CR.MCR.CFaVS.HbowEud
<i>Alcyonium digitatum</i> with <i>Securiflustra securifrons</i> on tide-swept moderately wave-exposed circalittoral rock	CR.MCR.EcCr.FaAlCr.Sec
Anemones, including <i>Corynactis viridis</i> , crustose sponges and colonial ascidians on very exposed or wave surged vertical infralittoral rock	IR.FIR.SG.CrSpAsAn
<i>Laminaria saccharina</i> , <i>Chorda filum</i> and dense red seaweeds on shallow unstable infralittoral boulders or cobbles	IR.HIR.KSed.LsacChoR
Circalittoral fine mud	SS.SMu.CFiMu
Circalittoral sandy mud	SS.SMu.CSaMu
<i>Philine aperta</i> and <i>Virgularia mirabilis</i> in soft stable infralittoral mud	SS.SMu.IFiMu.PhiVir
Offshore circalittoral mud	SS.SMu.OMu
Sparse <i>Modiolus modiolus</i> , dense <i>Cerianthus lloydii</i> and burrowing holothurians on sheltered circalittoral stones and mixed sediment	SS.SMx.CMx.CIlModHo
<i>Cerianthus lloydii</i> and other burrowing anemones in	SS.SMx.CMx.CIlMx

Biotope Name/ Species Common Name	Biotope Code/ Scientific name
circalittoral muddy mixed sediment	
<i>Cerianthus lloydii</i> with <i>Nemertesia</i> spp. and other hydroids in circalittoral muddy mixed sediment	SS.SMx.CMx.CIloMx.Nem
<i>Mysella bidentata</i> and <i>Thyasira</i> spp. in circalittoral muddy mixed sediment	SS.SMx.CMx.MysThyMx
<i>Ophiothrix fragilis</i> and/or <i>Ophiocomina nigra</i> brittlestar beds on sublittoral mixed sediment	SS.SMx.CMx.OphMx
<i>Venerupis senegalensis</i> , <i>Amphipholis squamata</i> and <i>Apseudes latreilli</i> in infralittoral mixed sediment	SS.SMx.IMx.VsenAsquAps
Offshore circalittoral mixed sediment	SS.SMx.OMx
Polychaete-rich deep <i>Venus</i> community in offshore gravelly muddy sand	SS.SMx.OMx.PoVen
Brittle star	<i>Ophiopsila annulosa</i>
Deep-water brittlestar	<i>Asteronyx loveni</i>
Sea cucumber	<i>Havelockia inermis</i>
Sea cucumber	<i>Ocnus planci</i>
Sea cucumber	<i>Parastichopus tremulus</i>
Sea cucumber	<i>Psolus phantapus</i>
Pogonophoran worm	<i>Siboglinum holmei</i>
Echiuran worm	<i>Amalosoma eddystonense</i>
Nudibranch	<i>Aeolidiella sanguinea</i>
Sea slug	<i>Aldisa zetlandica</i>
Marine snail	<i>Buccinum humphreysianum</i>
Mollusc	<i>Calliopaea oophaga</i>
Mollusc	<i>Devonia perrieri</i>
Mollusc	<i>Eubranchus doriae</i>
Mollusc	<i>Margarites groenlandicus</i>
Mollusc	<i>Okenia leachii</i>
Lagoon sea slug	<i>Tenellia adspersa</i>
Sea slug	<i>Trapania pallida</i>
Mollusc	<i>Hanleya nagelfar</i>
Mollusc	<i>Neomenia dalyelli</i>
Mollusc	<i>Leptochiton sarsi</i>
Northern blind limpet	<i>Lepeta caeca</i>
Mollusc	<i>Osteopelta ceticola</i>
Nudibranch	<i>Kaloplocamus ramosus</i>
Nudibranch	<i>Tritonia episcopalis</i>
Mollusc	<i>Nematomenia banulensis</i>
Mollusc	<i>Astarte acuticostata</i>
Mollusc	<i>Chlamys alicei</i>
Mollusc	<i>Chlamys sulcata</i> (OF. Muller, 1776)
Mollusc	<i>Lepton lacerum</i>
Mollusc	<i>Malletia abyssorum</i>
Mollusc	<i>Mancikellia pumila</i>
Mollusc	<i>Myonera sulcifera</i>
Deepsea oyster	<i>Neopycnodonte cochlear</i>
Mollusc	<i>Nucula tumidula</i>
Northern nutclam	<i>Nuculana pernula</i>
Mollusc	<i>Tropidomya abbreviata</i>
Mollusc	<i>Alvania jeffreysi</i>
Mollusc	<i>Alvania wyvillethomsoni</i>

Biotope Name/ Species Common Name	Biotope Code/ Scientific name
Mollusc	<i>Alvania zetlandica</i>
Mollusc	<i>Bathybela nudator</i>
Mollusc	<i>Bathycrinicola curta</i>
Mollusc	<i>Bathycrinicola macrapex</i>
Mollusc	<i>Benthomangelia macra</i>
Mollusc	<i>Boreotrophon dabneyi</i>
Mollusc	<i>Brachystomia carrozzai</i> ; <i>Odostomia carrozzai</i>
Mollusc	<i>Buccinum oblitum</i>
Mollusc	<i>Cirsonella romettensis</i>
Mollusc	<i>Claviscala richardi</i>
Mollusc	<i>Crinolamia angustispira</i>
Mollusc	<i>Curveulima macrophthalmica</i>
Greenland wentletrap	<i>Epitonium greenlandicum</i>
Mollusc	<i>Fusceulima profectilabrum</i>
Mollusc	<i>Ganesa nitidiscula</i>
Mollusc	<i>Gymnobela aquilarum</i>
Mollusc	<i>Gymnobela engonia</i>
Mollusc	<i>Heliacus subvariegatus</i>
Mollusc	<i>Liostomia clavula</i>
Mollusc	<i>Lissotesta turrata</i>
Mollusc	<i>Lusitanops sigmoidea</i>
Mollusc	<i>Metzgeria gagei</i>
Mollusc	<i>Mitrella rosacea</i>
Mollusc	<i>Mohnia mohni</i>
Mollusc	<i>Odostomia angusta</i>
Mollusc	<i>Odostomia nitens</i>
Mollusc	<i>Oenopota dictyophora</i>
Mollusc	<i>Oenopota scalaris</i>
Mollusc	<i>Ophieulima minima</i>
Mollusc	<i>Papuliscala cerithielloides</i>
File paper-bubble	<i>Philine lima</i>
Mollusc	<i>Pseudosetia turgida</i>
Mollusc	<i>Rhinodiaphana ventricosa</i>
Mollusc	<i>Skenea ossiansarsi</i>
Mollusc	<i>Skenea profunda</i>
Mollusc	<i>Solariella amabilis</i>
Mollusc	<i>Solariella cinta</i>
Mollusc	<i>Solaria obscura</i>
Mollusc	<i>Solariella varicosa</i>
Mollusc	<i>Tjaernoieia exquisita</i>
Destiny colus	<i>Turrisipho lachesis</i>
Mollusc	<i>Xyloskenea naticiformis</i>
Nemertean	<i>Amphiporus hastatus</i>
Nemertean	<i>Carinoma armandi</i>
Nemertean	<i>Cerebratulus fuscus</i>
Nemertean	<i>Emplectonema neesii</i>
Nemertean	<i>Procephalothrix filiformis</i>
Nemertean	<i>Psammamphiporus elongatus</i>
Nemertean	<i>Ramphogordius sanguineus</i>



Biotope Name/ Species Common Name	Biotope Code/ Scientific name
Nemertean	<i>Tetrastemma robertianae</i>
Nemertean	<i>Tetrastemma vermiculus</i>
Nemertean	<i>Tubulanus linearis</i>
Sponge	<i>Clathria barleei</i>
Sponge	<i>Phakellia ventilabrum</i>
Sponge	<i>Eurypon clavatum</i>
Sponge	<i>Macandrewia azorica</i>
Sponge	<i>Mycale cf. contarenii</i>
Sponge	<i>Mycale similaris</i> Current name: <i>Mycale subclavata</i>
Sponge	<i>Myxilla perspinosa</i>
Sponge	<i>Quasillina brevis</i>
Sponge	<i>Spongionella pulchella</i>
Sponge	<i>Sycandra utriculus</i>
Football sea squirt	<i>Diazona violacea</i>
Sea squirt	<i>Pyura microcosmus</i>
Sea squirt	<i>Styela gelatinosa</i>
Sea squirt	<i>Synoicum incrustatum</i>
Sea squirt	<i>Leptoclinides faeroensis</i>
Brown alga	<i>Dermocorynus montagnei</i>
Brown alga	<i>Asperococcus compressus</i>
Red alga	<i>Aglaothamnion priceanum</i>
Brown alga	<i>Desmarestia dresnayi</i>
Red alga	<i>Leblondiella densa</i>
Brown alga	<i>Sphacelaria mirabilis</i>
Red alga	<i>Halothrix lumbricalis</i>
Red alga	<i>Cruoria cruoriaeformis</i>
Devonshire cup-coral	<i>Caryophyllia smithii</i>
Glaucus pimplet	<i>Anthopleura thallia</i>
Red dead man's fingers	<i>Alcyonium glomeratum</i>
Hydroid	<i>Obelia bidentata</i>
Hydroid	<i>Tamarisca tamarisca</i>
Hydroid	<i>Ventromma halecioides</i>
Sea anemone	<i>Halcampoides non elongatus</i>
Sea anemone	<i>Scolanthus callimorphus</i>
Burrowing anemone	<i>Edwardsia non timida</i>
Bryozoan	<i>Arachnidium clavatum</i>
Bryozoan	<i>Buskea quincuncialis</i>
Bryozoan	<i>Escharoides mamillata</i>
Bryozoan	<i>Smittina crystallina</i>
Bryozoan	<i>Ammatophora nodulosa</i>
Bryozoan	<i>Aspididelectra melolontha</i>
Bryozoan	<i>Bowerbankia gracillima</i>
Bryozoan	<i>Celleporina decipiens</i>
Bryozoan	<i>Farrella repens</i>
Bryozoan	<i>Palmicellaria elegans</i>
Bryozoan	<i>Schizomavella cristata</i>
Cranch's spider crab	<i>Achaeus cranchii</i>
Crab	<i>Bathynectes longipes</i>
Amphipod	<i>Cerapus crassicornis</i>

Biotope Name/ Species Common Name	Biotope Code/ Scientific name
Amphipod	<i>Eriopisa elongata</i>
Amphipod	<i>Laetmatophilus tuberculatus</i>
Amphipod	<i>Parvipalpus capillaceus</i>
Amphipod	<i>Leptocheirus hirsutimanus</i>
Amphipod	<i>Leptocheirus pectinatus</i>
Small-headed clingfish	<i>Apletodon dentatus</i>
Tusk	<i>Brosme brosme</i>
Allis shad	<i>Alosa alosa</i>
Twaite shad	<i>Alosa fallax</i>
Tope shark	<i>Galeorhinus galeus</i>

## **APPENDIX 6 RECOMMENDED LIST OF PRIORITY MARINE FEATURES IN SCOTTISH TERRITORIAL WATERS**

The recommended list of Priority Marine Features in Scottish territorial waters is provided below. For each feature a table outlining the key component biotopes and/ or species is provided, alongside a reference to the relevant data workbook (listed at Appendix 3) which contains the detailed feature assessments.

In addition, for each feature, a brief summary of the information which influenced our assessments against the key importance criteria is provided. These summaries are not intended to be detailed reviews, but rather short descriptions of the rationale behind each feature's inclusion on the list. We recognise that, within these summaries, various geographic terms (e.g. UK, British Isles, Britain) are used to place the distribution and/ or population of a particular feature in context. This is largely an artefact of the range of information sources used. A decision was taken not to standardise these terms, because to do so may have changed the meaning intended by the original source.

Ultimately it is intended that the species and habitats presented here will be combined with a set of features identified in offshore waters to form a recommended list of Priority Marine Features across Scotland's seas.

## **Blue mussel beds**

Blue mussels, *Mytilus edulis*, are very common all around the coast of the British Isles. Although Scottish mussel beds only make up a small proportion of the British resource, they play a vital role in certain areas with extensive beds and significant wild mussel fisheries on the tidal flats of the Solway and Dornoch Firths.

Mussel beds are of considerable functional importance as they stabilise the sediment, have a major role in nutrient cycling, provide community structure, increase diversity and are food for other species. Subtidal mussel beds are highly vulnerable to damage from demersal fishing. Mussel beds are included in the UK Biodiversity Action Plan. The species *Mytilus edulis* did not pass the criteria assessment in its own right and so is not included.

<b>Included features Common name or Biotope name</b>	<b>Scientific name or Biotope code</b>	<b>Spreadsheet number</b>
<i>Mytilus edulis</i> beds on littoral sediments	LS.LBR.LMus.Myt	1
<i>Mytilus edulis</i> and <i>Fabricia sabella</i> in littoral mixed sediment	LS.LSa.St.MytFab	1
<i>Mytilus edulis</i> beds on sublittoral sediment	SS.SBR.SMus.MytSS	3
<i>Mytilus edulis</i> beds on reduced salinity infralittoral rock	IR.LIR.IFaVS.MytRS	2

## **Burrowed mud**

Undisturbed mud in both shallow and deep water is extensively burrowed by several species, particularly crustaceans such as *Nephrops norvegicus* and *Maera loveni*. Tall seapens and the burrowing fireworks anemone *Pachycerianthus multiplicatus* are characteristic epifauna of sheltered mud communities; these are large animals and recorded as uncommon although they may be numerous at particular sites. Scottish sea lochs and the northern North Sea have an estimated 95% of British records of inshore and deep burrowed mud. Elsewhere in Europe these habitats are recorded from the Norwegian North Sea and fjords, and from a few sites around the French and Irish coasts.

This group of biotopes and species are highly vulnerable to damage by seabed trawling activities, particularly for *Nephrops*. The Scottish inshore populations of *Funiculina quadrangularis* are globally important; there are few other places where this seapen occurs inshore in such large beds, although the species is more widespread offshore. Scotland also has a large proportion of the regional/global population of *P. multiplicatus*.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Seapens and burrowing megafauna in circalittoral fine mud	SS.SMu.CFiMu.SpMmeg	3
Burrowing megafauna and <i>Maxmuelleria lankesteri</i> in circalittoral mud	SS.SMu.CFiMu.MegMax	3
Tall seapen	<i>Funiculina quadrangularis</i>	7
Fireworks anemone	<i>Pachycerianthus multiplicatus</i>	7
Mud burrowing amphipod	<i>Maera loveni</i>	9

## Cold-water coral reefs

The most extensive cold-water coral reefs known to date are from inshore sites in western Norway and in deep water beyond the shelf break around the North-East Atlantic. However, some areas of reef have been recorded from deep (ca. 50-100 m) inshore waters in Scotland and they are also known from the North Sea attached to oil industry structures. The best examples in Scottish territorial waters are found off the Island of Mingulay on the west coast. The Mingulay reef structures are known to be at least 4000 years old (14C-dating by Roberts *et al.*, 2005) with new work showing they go back to 5000 years (14C and U/Th dating, Douarin unpublished data)

Cold-water coral reefs are structurally complex, species rich communities and are highly vulnerable to damage by demersal trawling and to localised effects of oil and gas drilling and scientific research sampling. It has been agreed by OSPAR that *Lophelia pertusa* reefs face grievous threat and are declining due to destructive fishing practices (Hall-Spencer & Stehfest 2009). *Lophelia pertusa* is also considered to be sensitive to potential effects of climate change such as ocean warming. The species is shown to be highly responsive to changes in local temperature, increasing metabolic rate with warming (Dodds *et al.*, 2007). If food supplies fail to increase to match increased metabolic demand these coral reefs may not be able to sustain themselves.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
<i>Lophelia</i> reefs	SS.SBR.Crl.Lop	4

### Reference:

- Dodds L.A., Roberts J.M., Taylor A.C., Marubini F. 2007. Metabolic tolerance of the cold-water coral *Lophelia pertusa* (Scleractinia) to temperature and dissolved oxygen change. *Journal of Experimental Marine Biology and Ecology* **349**: 205-214
- Hall-Spencer, J., & Stehfest, K. 2009. Draft Background Document for *Lophelia pertusa* reefs. Assessment of *Lophelia pertusa* reefs in the OSPAR area. Report presented by the UK to the OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic. Meeting of the Biodiversity Committee (BDC) Stockholm: 23-27 February 2009
- Roberts JM, Brown CJ, Long D Bates CR (2005). Acoustic mapping using a multibeam echosounder reveals cold-water coral reefs and surrounding habitats. *Coral Reefs* 24: 654-669

## **Flame shell beds**

The flame shell *Limaria hians* is a bivalve that builds nests or galleries with its byssal threads in the sediment surface, consolidating loose material to form reefs that stand 10 to 20 cm above the sediment surface. By stabilizing the seabed in this way, they provide a structure for colonisation by other species and greatly increase the diversity of the area. Hall-Spencer and Moore (2000) observed that in the tidal narrows systems of sea lochs, *L. hians* nests can form continuous reefs covering several hectares in extent.

Beds of *L. hians* are known from the Scottish west coast with the most extensive and undisturbed examples found in Loch Sunart. They have been damaged historically by seabed trawling - there were once large beds in the Firth of Clyde for instance - and are highly vulnerable to damage by bottom gear. Large and pristine reefs are now only known and surveyed from a few west coast Scottish locations.

The species *Limaria hians* is not included, as its primary conservation importance is as part of the biotope.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
<i>Limaria hians</i> beds in tide-swept sublittoral muddy mixed sediment	SS.SMx.IMx.Lim	3

Reference:

Hall-Spencer, J. & Moore, P. G. 2000. *Limaria hians* (Mollusca: Limacea): a neglected reef-forming keystone species. *Aquatic Conservation: Marine and Freshwater Ecosystems* **10**: 267–277.

## Horse mussel beds

Beds of the horse mussel *Modiolus modiolus* are highly diverse examples of biogenic reef structures. British horse mussel beds form a significant proportion of the European resource, with the only other beds recorded in this part of the North-East Atlantic found along the north and north-east coast of Norway (OSPAR map in NBN). There are no beds recorded in the Norwegian section of the North Sea. Scotland holds an estimated 85% of British horse mussel beds.

Horse mussel beds are highly vulnerable to demersal fishing, particularly scallop dredging which destroys the integrity of the beds. Recovery after significant damage would take many years, particularly as *Modiolus modiolus* is a very long lived species. They are of considerable functional importance.

*Modiolus modiolus* beds are included as a UK BAP Habitat. Service (1998) suggested limits of acceptable change for horse mussel populations in Strangford Lough, but noted that further research was required to derive ecological quality standards. Horse mussel reefs appear to be relatively stable communities in which any detectable changes over periods of a few years are likely to be regarded as unacceptable (Holt *et al.*, 1998 cited by Scottish Environment Link review).

The species *Modiolus modiolus* is not included as its primary conservation importance is as part of the biotope.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
<i>Modiolus modiolus</i> beds with hydroids and red seaweeds on tide-swept circalittoral mixed substrata	SS.SBR.SMus.ModT	3
<i>Modiolus modiolus</i> beds on open coast circalittoral mixed sediment	SS.SBR.SMus.ModMx	3
<i>Modiolus modiolus</i> beds with fine hydroids and large solitary ascidians on very sheltered circalittoral mixed substrata	SS.SBR.SMus.ModHAs	3
<i>Modiolus modiolus</i> beds with <i>Chlamys varia</i> , sponges, hydroids and bryozoans on slightly tide-swept very sheltered circalittoral mixed substrata	SS.SBR.SMus.ModCvar	3

### References:

Holt, T.J., Rees, E.I., Hawkins, S.J. and Seed, R., 1998. Biogenic Reefs (volume IX). An overview of dynamic and sensitivity characteristics for conservation management of marine SACs. *Scottish Association for Marine Science (UK Marine SACs Project)*. 170 pp.

Scottish Environment Link. Evidence for damage to marine habitats: a literature review. Horse Mussel Beds (*Modiolus modiolus*). <http://www.savescottishseas.org/pdfs/DamageHorseMusselBeds.pdf>

Service, M., 1998. Recovery of benthic communities in Strangford Lough following changes in fishing practice. Report cited by MarLIN Website



### **Inshore deep mud with burrowing heart urchins**

There are scattered records of this biotope from Scottish sea lochs and one from Strangford Lough in Northern Ireland. The sea urchin *Brissopsis lyrifera* is frequent in North Sea sediments, particularly the northern North Sea, and occasional in the Irish Sea. The biotope may therefore be more widespread in Scottish waters than elsewhere in the UK. It is highly vulnerable to damage from bottom trawling.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
<i>Brissopsis lyrifera</i> and <i>Amphiura chiajei</i> in circalittoral mud	SS.SMu.CFiMu.BlyrAchi	3

### **Intertidal mudflats**

Intertidal mudflats are extensive in the Solway and the other Firths. Some of the mudflats are considered of particular importance such as those in the Cromarty Firth, which support eelgrass beds, and those in the Solway. Mudflats are often important bird feeding grounds.

There are a large number of potential threats to this feature including sea level rise, shellfish extraction, land claim and coastal development, pollution and recreational activities.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Littoral mud	LS.LMu	1

### **Kelp and seaweed communities on sublittoral sediment**

Kelp and seaweed communities on sublittoral sediments are particularly common in Scotland, although they are recorded all around the British Isles. These habitats are generally very species rich (those sub-biotopes that are considered to be less diverse are specifically excluded from the feature description) and are vulnerable to damage by demersal fishing.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Kelp and seaweed communities on sublittoral sediment <sup>1</sup>	SS.SMp.KSwSS	3

<sup>1</sup> The following sub-biotopes of 'Kelp and seaweed communities on sublittoral sediment' are specifically excluded: 'Mats of *Trailiella* on infralittoral muddy gravel (SS.SMp.KSwSS.Tra)' & 'Filamentous green seaweeds on low salinity infralittoral mixed sediment or rock (SS.SMp.KSwSS.FilG)'

### Low or variable salinity habitats

Low or variable salinity habitats are an important and diverse feature of the Scottish marine environment and Scotland has a large proportion of the national and regional resource. The biotopes included in this group represent the range of low and variable salinity communities. The mollusc *Hydrobia acuta neglecta* has been included; a large proportion of the British records of this species are from Scotland.

This group includes three species of stonewort which are all UK BAP priority species. *Tolypella nidifica* is also included in the SNH Species Action Framework and is now known in the UK from only two sites, both in Scotland. All three species live in low or variable salinity habitats, including lagoons, and have declined in their distribution. Scottish saline lagoons provide probably the best stronghold for stoneworts outside the Baltic Sea. *Lamprothamnium* populations in Scotland are regarded as Globally Important with the Hebridean sites possibly representing the most secure global stronghold for the species; the other species are Nationally Important.

These brackish habitats and species are highly vulnerable to coastal development, pollution, changes in hydrodynamic regime and changing sea levels.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Faunal communities on variable or reduced salinity infralittoral rock	IR.LIR.IFaVS	2
Kelp in variable or reduced salinity	IR.LIR.KVS	2
Submerged fucoids, green or red seaweeds (low salinity infralittoral rock)	IR.LIR.Lag	2
Sublittoral mud in low or reduced salinity (lagoons)	SS.SMu.SMuLS	3
Bird's nest stonewort	<i>Tolypella nidifica</i>	5
Baltic stonewort	<i>Chara baltica</i>	5
Foxtail stonewort	<i>Lamprothamnium papulosum</i>	5
Small brackish water snail	<i>Hydrobia acuta neglecta</i>	14

## **Maerl beds**

Maerl beds are found along the west coasts of the British Isles from Shetland to south-west England, but the vast majority of beds are in Scotland. OSPAR maps show that Scotland has approximately 30% of the maerl beds in north-west Europe, with others recorded from the Canaries, north-west France, west Ireland and north-west Iceland; they are rare in Sweden and Norway. Maerl beds, including dead maerl, have a complex structure which supports species rich communities, with many species which live preferentially on maerl. They are fragile and easily damaged by traditional and hydraulic scallop dredging, extraction and pollution (Hall-Spencer & Moore, 2000; Hall-Spencer *et al.*, 2003). Hauton *et al.* (2003), in a study of the effects of hydraulic dredging, commented that undredged maerl grounds can be of long-term benefit to fisheries, acting as reproductive reservoirs for future generations of commercially important bivalve species.

All of the maerl bed sub-biotopes which occur in Scotland are included in this group and so are not listed separately. Maerl species are not included as their primary conservation value is as part of the habitat.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Maerl beds	SS.SMp.Mrl	3

### References:

- Hall-Spencer, J.M. & Moore P.G. 2000. Scallop dredging has profound, long-term impacts on maerl habitats. *ICES Journal of Marine Science* **57**: 1407–1415.
- Hall-Spencer, J.M, Grall, J, Moore, P.G. & Atkinson, R.J.A. 2003. Bivalve fishing and maerl bed conservation in France and the UK: retrospect and prospect. *Aquatic Conservation: Marine and Freshwater Ecosystems* **13**: S33–S41.
- Hauton, C., Hall-Spencer, J., & Moore, P. G. 2003. An experimental study of the ecological impacts of hydraulic bivalve dredging on maerl. *ICES Journal of Marine Science* **60**: 381–392.

### **Maerl or coarse shell gravel with burrowing sea cucumbers**

The sea cucumber *Neopentadactyla mixta* is recorded from northern Norway to the Bay of Biscay with the majority of records from British seas. The biotope which is included here is recorded only from the west coasts of the British Isles. It is likely to be more common than records suggest but most records are from west Scotland. This is a species rich community which often occurs on the edge of maerl beds and in areas of dead maerl and other coarse gravels. It is highly vulnerable to damage from scallop dredging.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
<i>Neopentadactyla mixta</i> in circalittoral shell gravel or coarse sand	SS.SCS.CCS.Nmix	3

### **Native oysters**

There is historical documentation which shows that beds of the native oyster, *Ostrea edulis*, were once much more widespread in Scotland and Europe, but have been decimated by harvesting. Oysters are an important commercial species and have functional importance as they substantially increase the biodiversity of an area.

This feature includes both the biotope and the species, as individual oysters may occur in other biotopes and are threatened by harvesting in any habitat.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
<i>Ostrea edulis</i> beds on shallow sublittoral muddy mixed sediment	SS.SMx.IMx.Ost	3
Native oyster	<i>Ostrea edulis</i>	14

## Northern sea fan and sponge communities

The Northern sea fan communities are very diverse communities and highly characteristic of moderately exposed reefs on the Scottish west coast. All British records of the species *Swiftia pallida* and these sea fan biotopes are from Scotland. *S. pallida* also occurs on the west coasts of Norway and Sweden, in south-west Ireland and in deep water in the Bay of Biscay although this last record may be a different species; *Swiftia rosea* in Norway is probably a separate species.

Deep sponge communities are also very diverse and the majority of British records are from Scotland. In Scottish waters, these communities are found off the north-east coast of Shetland and to the west of the Hebrides. Closer inshore deep sponge communities are located off the coast of Mingulay, the Firth of Lorn and in the mouth of Loch Sunart. Deep sponge communities are also recorded from Northern Ireland, the west coast of Ireland and the Isles of Scilly.

Pressures on this group of biotopes include siltation from fishfarms and fishing activities and the risk of physical damage from mobile fishing gear. The species *Swiftia pallida*, which is the host for the nationally rare anemone *Amphianthus dohrnii*, is included in this group as it is considered to be of conservation importance in its own right.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
<i>Caryophyllia smithii</i> and <i>Swiftia pallida</i> on circalittoral rock	CR.MCR.EcCr.CarSwi	2
Mixed turf of hydroids and large ascidians with <i>Swiftia pallida</i> and <i>Caryophyllia smithii</i> on weakly tide-swept circalittoral rock	CR.HCR.XFa.SwiLgAs	2
Deep sponge communities (circalittoral)	CR.HCR.DpSp	2
Northern sea fan	<i>Swiftia pallida</i>	7

## Seagrass beds

Seagrass beds are found on the west coasts of the British Isles from Shetland southwards, and in the major inlets on the east coast. The Cromarty Firth has what may be the largest area of intertidal eelgrass in Britain, possibly in Europe, as well as significant beds of the tasselweed *Ruppia maritima*. OSPAR habitat maps suggest that Scotland has an estimated 20% of the seagrass beds in north-west Europe.

Seagrass beds are often associated with cockle beds and may be damaged by suction dredging for bivalves, such as cockles and *Mercenaria* sp. There was a major decline in seagrass beds in the 1920s and 1930s and, given their importance in coastal processes, there have been a number of scientific research and experimental management studies as a result. Seagrasses are considered to be of great ecological and economic importance and act as nutrient and sediment sinks. They promote the accumulation and binding of sediment and thus absorb a proportion of incident wave energy and may form a natural coastal defence. In the past seagrasses have been put to a number of uses world-wide such as sound-proofing, insulation, roofing thatch, binding soil, packaging, basket weaving and in the manufacture of 'coir' matting.

The seagrass beds feature includes both intertidal and subtidal beds. The individual species are excluded as their conservation importance is as part of the habitat.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
<i>Zostera noltii</i> beds in littoral muddy sand	LS.LMp.LSgr.Znol	1
<i>Zostera marina/angustifolia</i> beds on lower shore or infralittoral clean or muddy sand	SS.SMp.SSgr.Zmar	3
<i>Ruppia maritima</i> in reduced salinity infralittoral muddy sand	SS.SMp.SSgr.Rup	3

### **Sea loch egg wrack beds**

Beds of the unattached form of the egg wrack *Ascophyllum nodosum* ecad *mackaii* are found in Britain and Ireland only, in sheltered embayments such as sea lochs. Scotland has most records worldwide of this growth form. The loose mats provide a sheltered and humid habitat for many mobile mid-shore animals which would otherwise be unable to live on open sediments or shingle, such as gammarid amphipods, shore crabs and littorinid snails. Fish such as young eels, *Anguilla anguilla*, and viviparous blennies, *Zoarces viviparus*, may also shelter in the weed.

The attached form of *A. nodosum* is still collected on a small scale in western Scotland for the extraction of alginates and as packing material for shellfish transport. The unattached *A. nodosum* ecad *mackaii* is particularly attractive to collectors as it is easy to harvest. The habitat is highly vulnerable to coastal developments such as shore armouring, road widening, land claim and causeway construction.

The sea loch egg wrack beds feature only contains the biotope LR.LLR.FVS.Ascmac. The individual species is not included, as its conservation importance is as part of the habitat.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
<i>Ascophyllum nodosum</i> ecad <i>mackaii</i> beds on extremely sheltered mid eulittoral mixed substrata.	LR.LLR.FVS.Ascmac	1

### **Serpulid aggregations**

*Serpula vermicularis* aggregations are oases of high epifaunal diversity on sediment plains and are only known from two sites in Britain; Loch Creran and Loch Teacuis. Living reefs are no longer found at a third known site in Loch Sween. Elsewhere, the aggregating form of *Serpula vermicularis* has only been reported from a few locations on the west coast of Ireland and in an Italian lagoon. Their fragile structure makes them highly vulnerable to damage from physical activities such as mooring, anchoring and fishing.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
<i>Serpula vermicularis</i> reefs on very sheltered circalittoral muddy sand <sup>2</sup>	SS.SBR.PoR.Ser	3

<sup>2</sup> As well as the serpulid reefs biotope, this feature specifically includes smaller aggregations of *Serpula vermicularis*

### **Submarine structures made by leaking gases**

There are two types of structure included within this category: bubbling reefs; and submarine structures associated with pockmarks. At the moment there are eight British records of which six are in Scottish waters. This is currently an area of active research. These structures are vulnerable to damage by demersal fishing and by oil and gas development.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Submarine structures made by leaking gases	No code	4

### **Tide-swept algal communities**

Tide-swept algal communities are a feature of much of the littoral and infralittoral around Scottish coasts and are frequently important in the tidal narrows of Scottish sea lochs. They are species rich, structurally complex habitats. The majority of British records are from Scotland and Northern Ireland although some of these biotopes are characteristic of other areas and most records of IR.HIR.KSed.XKHal are from the Sarns area in Wales. It is likely that this particular biotope is under recorded in Scotland. Mixed substrate habitats such as these are highly vulnerable to impacts from scallop dredging.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Fucoids in tide-swept conditions	LR.HLR.FT	1
<i>Halidrys siliquosa</i> and mixed kelps on tide-swept infralittoral rock with coarse sediment	IR.HIR.KSed.XKHal	2
Kelp and seaweed communities in tide-swept sheltered conditions <sup>3</sup>	IR.MIR.KT	2
<i>Laminaria hyperborea</i> on tide-swept, infralittoral mixed substrata.	IR.MIR.KR.LhypTX	2

<sup>3</sup> The following sub-biotopes are specifically excluded: *Laminaria saccharina* with foliose red seaweeds and ascidians on sheltered tide-swept infralittoral rock (IR.MIR.KT.LsacT); & Filamentous red seaweeds, sponges and *Balanus crenatus* on tide-swept variable-salinity infralittoral rock (IR.MIR.KT.FilRVS).



### **Tide-swept coarse sands with burrowing bivalves**

This coarse mixed sand with *Moerella* and bivalves is uncommon in the British Isles. Many components of the biotope are moderately robust as it occupies a relatively dynamic habitat. However, the biotope is vulnerable to activities such as trawling, aggregate extraction and offshore construction and one of its important component bivalves *Spisula solida* is commercially fished in some areas. Long-lived venerid bivalves, which can be an important food source for birds, are thought to be particularly sensitive to disturbance and *Spisula solida* appears to have declined in some areas.

<b>Included features Common name or Biotope name</b>	<b>Scientific name or Biotope code</b>	<b>Spreadsheet number</b>
<i>Moerella</i> spp. with venerid bivalves in infralittoral gravelly sand <sup>4</sup>	SS.SCS.ICS.MoeVen	3

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<sup>4</sup> Recent data suggests that the community associated with this biotope may also be present in waters deeper than is characteristic of infralittoral biotopes. Pending further assessment and classification, this PMF includes examples of the community associated with SS.SCS.ICS.MoeVen even where it lies outside the typical depth range of the biotope.

### **Burrowing sea anemone**

A rare but conspicuous species of burrowing sea anemone, *Arachnanthus sarsi* has been recorded in Britain from the south-east coast of Coll, the islands to the south of Oban, St. Kilda and a few other sites in western Scotland, and from two sites in Ireland. It is relatively recently discovered and may be nocturnal. It lives on muddy seabeds.

This is one of the few rare species that have passed the assessment. At present, there are more records of *Arachnanthus sarsi* in Scotland than anywhere else and the species is vulnerable to the impacts of dredging and demersal fishing.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Burrowing sea anemone	<i>Arachnanthus sarsi</i>	7

### **Pink sea fingers**

*Alcyonium hibernicum* is a small soft coral which appears to be confined to British waters. It is very localised on the west coasts of the British Isles, although can be relatively common in suitable localities. It is found in the Firth of Lorn in similar habitats to *Swiftia pallida*. As almost 50% of the global records are from Scottish waters, the Scottish populations are considered of global importance. The species is considered sensitive to siltation from fishfarms and fishing activities as well as to physical disturbance by fishing gears.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Pink sea fingers	<i>Alcyonium hibernicum</i>	7

### **White cluster anemone**

Scotland has a large proportion of the regional and global populations of this scarce zooanthid, *Parazoanthus anguicomus*. It is found at scattered locations around Scotland and in deep water around northern Europe, south to Lundy Island and Brittany. It may be more widespread in deep water off the continental shelf.

The species is thought to be sensitive to siltation from fishfarms and fishing activities as well as to physical disturbance by fishing gears.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
White cluster anemone	<i>Parazoanthus anguicomus</i>	7

### Northern feather star

The northern feather star *Leptometra celtica* is a characteristic member of the sea loch fauna, recorded from Shetland and along the west coast. Although not uncommon in Scottish waters, there are few nearshore records outside Scotland. It is known from deep water to the south and west of Ireland and the entrance to the English Channel, but is not recorded from Scandinavian fjords. Elsewhere it has been recorded from the shelf edge from Scotland to the Mediterranean.

It occurs in fields on deeper inshore sediments which are sensitive to damage by demersal fishing.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Northern feather star	<i>Leptometra celtica</i>	10

### Fan mussel

Over 50% of the post-1950 British records of the fan mussel *Atrina fragilis* are from Scottish waters. This fragile species was once relatively common but populations have been severely depleted by dredging for scallops and it is now considered to be one of the most endangered molluscs in UK waters.

Tyler-Walters & Wilding (2009) note that fertilisation is dependent on the proximity of other individuals. When populations become very sparse, as is the case in Scottish waters, fertilisation failure is likely to be significant. With the population reduced to scattered individuals, recruitment may be sporadic and dispersal between different patches variable.

The species is highly sensitive and vulnerable to demersal fishing, particularly dredging.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Fan mussel	<i>Atrina fragilis</i>	14

#### Reference:

Tyler-Walters, H. & Wilding, C. 2009. *Atrina fragilis*. Fan mussel. Marine Life Information Network: Biology and Sensitivity Key Information Sub-programme [on-line]. Plymouth: Marine Biological Association of the United Kingdom. Available from: <<http://www.marlin.ac.uk/specieshabitats.php?speciesID=2680>>

## Heart cockle

Over 80% of the inshore records of the heart cockle *Glossus humanus* in the British Isles are from Scottish waters, although it may be more widely distributed offshore. Its distribution extends from Greenland and Norway to the Mediterranean, but there are few records outside the British Isles. It lives in muddier sediments than the similarly sized *Arctica islandica* and, whilst its functional significance is unclear, it is likely to be a food species for some fish.

It is highly vulnerable to demersal fishing in its muddy habitat.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Heart cockle	<i>Glossus humanus</i>	14

## Ocean quahog

An estimated 70% of the British records of the ocean quahog *Arctica islandica*, a long-lived bivalve which can live for up to 400 years, are from Scottish waters. Its sediment habitat is at risk from deepwater trawling and it is feared that commercial fishing may decimate stocks. The species takes an estimated 4 – 14 years to reach sexual maturity and needs up to 50 years to reach market size, but the breeding stock in an area can be wiped out in one trawl.

Recruitment in this bivalve is considered to be very sporadic with an Icelandic population recruiting at approximately 20 year intervals whilst a population on the Atlantic coast of the United States did not show any sign of recruitment over a 10 year period (Thorarinsdóttir, 1999 reported by Sabatini and Pizzolla, 2008).

*A. islandica* has been found in the stomach of North Sea cod and estimates indicate that some 40% of annual cod production in the Baltic Sea was dependent on *A. islandica* in the period 1970 - 1985.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Ocean quahog	<i>Arctica islandica</i>	14

### References:

Sabatini, M. & Pizzolla, P. 2008. *Arctica islandica*. Icelandic cyprine. Marine Life Information Network: Biology and Sensitivity Key Information Sub-programme [on-line]. Plymouth: Marine Biological Association of the United Kingdom. Available from: <<http://www.marlin.ac.uk/reproduction.php?speciesID=2588>>

Thorarinsdóttir, G.G., (1999). Lifespan of two long lived bivalves *Arctica islandica* and *Panopea generosa*. *Phuket Marine Biological Center Special Publication* 9: 41 -46.

## **European spiny lobster**

In Scotland, the European spiny lobster *Palinurus elephas* is historically found along the west and north coasts, ranging northwards to Orkney and Shetland. The greatest densities of the species occur in the south-west of the British Isles and, whilst it becomes increasingly less common moving northwards, it was once considered common in Scotland. European spiny lobster populations appear to have declined dramatically since the 1970s elsewhere in the UK and there are indications that the same could be the case in Scotland. Work is required to improve understanding of the status of the stock in Scottish waters.

This species has been heavily exploited and, although it is now rarely found inshore in Scotland, its numbers could be expected to increase with warming seas (Hiscock *et al.* 2001, 2004).

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
European spiny lobster	<i>Palinurus elephas</i>	9

### References:

Hiscock, K., Southward, A., Tittley, I., Jory, A. and Hawkins, S., 2001. The impact of climate change on subtidal and intertidal benthic species in Scotland. Report to Scottish Natural Heritage from the Marine Biological Association of the United Kingdom. Edinburgh, Scottish Natural Heritage (Survey and Monitoring Series).

Hiscock, K., Southward, A.J., Tittley, I. and Hawkins, S.J., 2004. Effects of changing temperature on benthic marine life in Britain and Ireland. *Aquatic Conservation: Marine and Freshwater Ecosystems* **14**: 333-362.

## **Eel (marine part of life cycle)**

The eel, *Anguilla anguilla*, spawn in the depths of the Sargasso Sea and the offspring return (via ocean transport and vertical movements) to spend their growing period in freshwater before migrating to deep waters in the sea. Scottish populations are thought to be of international importance.

The eel has experienced catastrophic European decline including in the UK. Populations have reduced to less than 10% of 1980 levels and the species is already considered to be vulnerable, endangered, threatened or extinct in 11 European countries. The eel has recently been added to IUCN Red List as 'critically endangered'. ICES have now produced an emergency plan to try and tackle the decline. The EU commission propose that eel management plans be drawn up for each River Basin District. Data for the whole of the UK is available, and although quantity and quality may be an issue within Scotland, declines here mirror those of elsewhere in Europe.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Eel ( <i>marine part of life cycle</i> )	<i>Anguilla anguilla</i>	11

### **Atlantic salmon (*marine part of life cycle*)**

The Atlantic salmon *Salmo salar* is found in suitable habitats all around the UK, but many of the important salmon rivers are in Scotland. The Scottish wild salmon populations are considered to be of global importance.

Runs of adults returning to their rivers to spawn have declined, particularly early running fish. The proximity of salmon farms to wild populations in many Scottish sea lochs and the frequency with which cultivated salmon escape, puts the local wild populations at risk from the spread of disease and increased competition. Salmon are functionally important as the different life stages are important as food to piscivorous birds, otters and sea mammals.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Atlantic salmon ( <i>marine part of life cycle</i> )	<i>Salmo salar</i>	11

#### References:

Heard, J., 2007. *Salmo salar*. Atlantic salmon. Marine Life Information Network: Biology and Sensitivity Key Information Sub-programme [on-line]. Plymouth: Marine Biological Association of the United Kingdom. [cited 15/02/2010]. Available from: <<http://www.marlin.ac.uk/speciesinformation.php?speciesID=4293>>

Scottish Natural Heritage. Conservation of Atlantic salmon in Scotland, Project website. Available from: <http://www.snh.org.uk/salmonlifeproject/index.asp>

### **European river lamprey (*marine part of life cycle*)**

The European river lamprey *Lampetra fluviatilis* occurs in coastal waters and estuaries throughout the British Isles, migrating upstream in many rivers to spawn in the strong current habitats. European river lamprey populations throughout Europe are thought to have markedly recovered following earlier declines, which were largely due to pollution (Freyhof and Kottelat, 2008). There is little historical information available on Scottish populations to assess any decline accurately, although there is some evidence to suggest a fall in numbers in the landlocked form found in Loch Lomond. The UK BAP assessment considered the strong UK populations to be internationally important, and considered their protection fundamental to the conservation of the species in the EC. Scotland has approximately 30% of the UK records of *L. fluviatilis*.

*Lampetra fluviatilis* can be functionally important as a prey species for piscivorous birds.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
European river lamprey ( <i>marine part of life cycle</i> )	<i>Lampetra fluviatilis</i>	11

#### Reference:

Freyhof, J. and Kottelat, M. 2008. *Lampetra fluviatilis*. In: IUCN 2009. IUCN Red List of Threatened Species. Version 2009.1. <[www.iucnredlist.org](http://www.iucnredlist.org)>.

### **Sea lamprey (*marine part of life cycle*)**

The sea lamprey *Petromyzon marinus* is the largest of the British and European lampreys, spending up to three years in marine habitats before migrating upstream to spawn. The species is reasonably widespread in UK rivers, with records concentrated in south and east Scotland, East Anglia and south-west England (JNCC, 2007). Scottish records are considered to be nationally important. Relatively little is known about the marine habitats and key prey species of sea lamprey (Maitland, 2003).

Insufficient historical data is available to assess population status accurately. However, based on anecdotal and limited empirical information, the species is thought to be in long term decline. Furthermore, surveys in the past ten years suggest recent declines in a number of rivers, particularly in the north and west of Scotland (Ecological Research Associates, 2005). The cause of these regional declines is not clear. More generally, pressures on the species include reduced water quality, habitat deterioration, obstruction to migration, and climate change. The species is listed on the Habitats Directive Annexes II & IV; Bern Convention Appendix III; under IUCN – least concern, trends unknown; and as a priority species under UKBAP.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Sea lamprey ( <i>marine part of life cycle</i> )	<i>Petromyzon marinus</i>	11

#### References:

- Ecological Research Associates (ERA). 2005. A national lamprey survey of Scotland. Report for Scottish Natural Heritage, Clydebank.
- Joint Nature Conservation Committee. 2007. Second Report by the UK under Article 17 on the implementation of the Habitats Directive from January 2001 to December 2006. Peterborough: JNCC. Available from: [www.jncc.gov.uk/article17](http://www.jncc.gov.uk/article17)
- Maitland, P. S., 2003. Ecology of the River, Brook and Sea Lamprey. Conserving Natura 2000 Rivers, Ecology Series No. 5. English Nature, Peterborough. <http://www.english-nature.org.uk/LIFEinUKRivers/publications/lamprey.pdf>



### **Sea trout (*marine part of lifecycle*)**

The sea trout *Salmo trutta* is the sea-migrant form of the freshwater brown trout. Sea trout migrate to the sea in spring and return to rivers as adults to spawn. The species is recorded throughout Scottish coastal waters, as well as in freshwater areas that are accessible from the sea. Scottish territorial waters are considered nationally important for this species and are also likely to be important in a European context. While at sea, sea trout tend to favour coastal areas including estuarine environments. Sea trout is a key prey species for a range of marine predators including bottlenose dolphin, harbour and grey seals, and many bird species. In turn, it predated crustaceans, molluscs and small fish, particularly sprat, sandeel and juvenile Atlantic herring.

Sea trout stocks in Scotland are considered to have suffered severe declines in recent years, although it is not clear what the causes of these declines are. This species is vulnerable to threats including water pollution and general habitat degradation, barriers to migration, increased predation, salmon farming (sea lice etc.) and climate change.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Sea trout ( <i>marine part of lifecycle</i> )	<i>Salmo trutta</i>	11

### **Sparling (*marine part of lifecycle*)**

Sparling, or European smelt as it is also known, is an anadromous species occurring in coastal and estuarine waters of western Europe, which migrates into rivers during spring to spawn.

Within Scotland, sparling are present in the Cree, Forth and Tay rivers and historically were recorded from at least 12 other river systems from the Clyde southward on the west coast and from the Tay southward on the East coast. Data for the Cree population are good, although relatively little is known about the populations in either the Forth or the Tay.

Sparling are severely declined in Scotland (and throughout the UK). It is likely that the primary cause of these declines is over-exploitation, which sparling are very vulnerable to. They are particularly easy to target because they enter rivers to spawn over a discrete time period every year. Sparling are also sensitive to pressures such as water pollution, general habitat degradation and barriers to migration.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Sparling ( <i>marine part of lifecycle</i> )	<i>Osmerus eperlanus</i>	11

### **Anglerfish (juveniles)**

The anglerfish or monkfish *Lophius piscatorius* is an important commercial fish found all around the British Isles. The majority of the adult population is in deep water outside the 12 nm limit but juveniles are commonly found in inshore waters (Hislop *et al.* 2001) and Scottish territorial waters are considered proportionally important. This is a very wide ranging species with juveniles occurring over large areas. Spawning is pelagic. Maturity is reached at around 7 years (males) to 9 years (females) and longevity is thought to be in the teens. Anglerfish prey on smaller fish such as spurdogs, rays, sandeels, cod and whiting but a range of items have been found in anglerfish stomachs including lobsters, crabs, squid and occasionally seabirds (Reeve, 2008). Populations have declined due to fishing pressure but are thought to be increasing again.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Anglerfish ( <i>juveniles</i> )	<i>Lophius piscatorius</i>	11

#### References:

Hislop JRG, Gallego A, Heath MR, Kennedy FM, Reeves SA, Wright PJ, 2001. A synthesis of the early life history of the anglerfish, *Lophius piscatorius* (Linnaeus, 1758) in northern British waters. *Ices Journal of Marine Science* **58**:70-86

Reeve, A. 2008. *Lophius piscatorius*. Angler fish. Marine Life Information Network: Biology and Sensitivity Key Information Sub-programme [on-line]. Plymouth: Marine Biological Association of the United Kingdom. Available from: <http://www.marlin.ac.uk/speciesinformation.php?speciesID=3728>

### **Atlantic herring (*juveniles and spawning adults*)**

The Atlantic herring *Clupea harengus* is a migratory species which is widely distributed in the North Atlantic (Barnes, 2008). It can form distinct stocks which may be considered nationally important with the three most important races in the east Atlantic being the winter spawning Norwegian and Icelandic herring, the autumn spawning Icelandic and North Sea herring and the Baltic herring (Binohlan, 2010). There is a separate, small, herring population to the west of Scotland and various components spawning off Scotland that contribute to the large North Sea population. Both populations are important to Scotland. The west coast stock is relatively data deficient, but considered to be fluctuating at a low level and being exploited below estimated maximum sustainable yield. Data are good for the North Sea stock and show that there is high fluctuation in this population year to year. Currently North Sea herring are in decline, due to poor recruitment, although the reason for this is unclear. Herring have a very particular habitat requirement when spawning, requiring sandy gravel and water flow. Juveniles inhabit inshore nursery grounds before moving to the migratory adult stock. Inshore areas in Scotland that are important as nursery grounds include the Firth of Forth, Moray Firth and west coast sea lochs (comment from Marine Scotland Science).

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Atlantic herring ( <i>juveniles and spawning adults only</i> )	<i>Clupea harengus</i>	11

#### References:

- Binohlan, C. B., 2010. *Clupea harengus* Linnaeus, 1758 , Atlantic herring . <http://www.fishbase.org/Summary/SpeciesSummary.php?id=24>
- Barnes, M., 2008. *Clupea harengus*. Atlantic herring. Marine Life Information Network: Biology and Sensitivity Key Information Sub-programme [on-line]. Plymouth: Marine Biological Association of the United Kingdom. [cited 15/02/2010]. Available from: <http://www.marlin.ac.uk/speciesinformation.php?speciesID=3017>

## Atlantic mackerel

The Atlantic mackerel *Scomber scombrus* is a very wide ranging pelagic species that makes extensive migrations. It is widely distributed in the continental shelf seas around the British Isles, usually at depths shallower than 200 m. It occurs in greater abundance on the shelf edges during winter. There are three stocks in the North-East Atlantic; North Sea (east), western (west) and southern (south). The North Sea stock decreased dramatically in the 1960s because of direct overfishing, and subsequent recruitment has been poor and unstable (FishBase). While in Scottish waters, the populations are considered of regional and possible global importance. Seasonally, Scottish territorial waters are considered to be of national importance.

*Scomber scombrus* can be extremely common, occurring in huge shoals feeding on small fish and prawns. It is a functionally important species, both presently and more so historically, as predator and prey.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Atlantic mackerel	<i>Scomber scombrus</i>	11

## Cod

Cod, *Gadus morhua*, range from the north and eastern coast of North America, around the southern tip of Greenland across the North Atlantic to the waters around Iceland, Faroe, the North Sea and the Barents Sea. It is found all around the British coast. The most important stocks are the Norwegian Arctic stock in the Barents Sea and the Icelandic stock, whilst the populations around Greenland and Newfoundland have declined dramatically. Scottish populations are considered to be regionally important.

Cod stocks are highly structured with coastal and offshore sub-populations (Wright *et al.*, 2006a,b; Nielsen *et al.*, 2009). Some measures in place may limit the local impact of fishing, such as the Clyde spawning closure. The majority of North Sea cod now appear to be found in waters deeper than 100 m in the northern North Sea whilst some inshore areas form important nursery areas for young cod (Gibb *et al.*, 2007). Historically, cod is functionally important as a voracious predator and probably as a prey item.

Cod is listed as vulnerable by the IUCN Red List of Threatened Species (Sobel, 1996), and is included under the grouped Biodiversity Action Plan for commercial marine fish. The species is also listed by the International Council for the Exploration of the Seas (ICES) as below 'safe biological limits', and by OSPAR as 'threatened and/or declining'. Due to the depleted nature of stocks, a recovery plan has been introduced in the EU under the Common Fisheries Policy. Long term and seasonal small closed areas exist, and real time closures have been used to reduce fishing mortality together with a greatly reduced total allowable catch (TAC).

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Cod	<i>Gadus morhua</i>	11

### References:

- Gibb FM, Gibb IM, Wright PJ, 2007. Isolation of Atlantic cod (*Gadus morhua*) nursery areas. *Marine Biology* **151**:1185-1194
- MarLIN. 2009. *Gadus morhua*. Atlantic cod. Marine Life Information Network: Biology and Sensitivity Key Information Sub-programme [on-line]. Plymouth: Marine Biological Association of the United Kingdom. Available from: <http://www.MarLIN.ac.uk/speciesimportance.php?speciesID=3359>
- Nielsen E, Wright, PJ, Hemmer-Hansen, J, Poulsen, NA, Gibb, IM, Meldrup, D, 2009. Population structure of cod (*Gadus morhua* L.) in the North Sea and west of Scotland; the role of sampling loci and individuals for inferring micro-geographical differentiation. *Marine Ecology Progress Series* **376**:213-225
- Sobel, J. 1996. *Gadus morhua*. In: *IUCN 2009. IUCN Red List of Threatened Species. Version 2009.1.* <[www.iucnredlist.org](http://www.iucnredlist.org)>. Accessed 26/10/09.
- Wright PJ, Neat FC, Gibb FM, Gibb IM, Thordarson H, 2006. Evidence for metapopulation structuring in cod from the west of Scotland and North Sea. *Journal of Fish Biology* **69**:181-199
- Wright PJ, Galley E, Gibb IM, Neat FC, 2006. Fidelity of adult cod to spawning grounds in Scottish waters. *Fisheries Research* **77**:148-158

## Ling

The ling, *Molva molva* is widely distributed in the North-East Atlantic including around the British Isles. It generally occurs offshore but both juveniles and adults are often found amongst inshore rocks with many small ling in sea lochs. Scotland is considered to have a large proportion of the British population, due to availability of suitable habitat.

The species is commercially fished using longlines and trawls around western Scotland. It is salted and dried as klipfisk and then exported to southern Europe (Rowley, 2008). There was a severe decline in populations in the 1960s-70s but numbers are now maintaining a stable low level (Comments from Marine Scotland Science/JNCC). Recent catches are mostly offshore, but historically it was fished closer inshore. It is an important prey item for seals and feeds in turn on other fish such as *Trisopterus esmarkii*, *Gadus morhua*, *Clupea harengus* and flat fish.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Ling	<i>Molva molva</i>	11

### Reference:

Rowley, S., 2008. *Molva molva*. Ling. Marine Life Information Network: Biology and Sensitivity Key Information Sub-programme [on-line]. Plymouth: Marine Biological Association of the United Kingdom. Available from: <http://www.marlin.ac.uk/speciesinformation.php?speciesID=3826>

## Norway pout

The Norway pout *Trisopterus esmarkii* is a short lived demersal species found in the North-East Atlantic from the Barents Sea south to the English Channel; it is found on all British coasts. The North Sea stocks have recently been assessed by ICES and, although they are subject to marked fluctuations, they are currently considered to be at full reproductive capacity (ICES, 2009). Recruitment is highly variable, due to the short life span of the species and the status of the stock is determined more by natural processes than by the fishery. The main spawning grounds are between Shetland and Norway and there are high numbers of Norway pout in the Minch over a wide area. Scottish waters out to 200 nm hold regionally significant populations of the species, whilst Scottish territorial waters (12 nm) are considered nationally important for Norway pout.

This is a highly commercial species caught mainly for fishmeal and historically the fishery includes bycatches of haddock, whiting, saithe, and herring (although these bycatches have been relatively low in recent years). Norway pout is a key prey species for several important fish species including hake, cod, saithe, haddock and mackerel.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Norway pout	<i>Trisopterus esmarkii</i>	11

### Reference:

ICES. 2009. Norway pout in Subarea IV (North Sea) and Division IIIa (Skagerrak-Kattegat). ICES Advice 2009, Book 6: 6.4.20. Viewed on line at: <http://www.ices.dk/committe/acom/comwork/report/2009/2009/nop-nsea.pdf>.

### **Saithe (juveniles)**

The saithe, *Pollachius virens*, is a benthopelagic species occurring both inshore and offshore. It usually enters coastal waters in spring and returns to deeper waters (up to 350 m) in winter. Most of the stock occurs outside the 12 nm limit, but inshore areas are very important for juveniles. In late summer and autumn young saithe are found in large numbers within Scottish and Norwegian coastal waters, usually on grounds which are unsuitable for commercial fishing.

Saithe is a highly valued commercial species for human consumption but the stock has been depleted so much by commercial fishing that recruitment has been affected. To maintain sustainable saithe fisheries and create a greater potential yield, the EU and Norway have agreed on a precautionary approach. The stock is now managed by annual TACs (total allowable catches), and a minimum mesh size for several types of fishing gear limits the bycatch of smaller individuals.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Saithe ( <i>juveniles</i> )	<i>Pollachius virens</i>	11

#### References:

Barnes, M. 2008. *Pollachius virens*. Saithe. Marine Life Information Network: Biology and Sensitivity Key Information Sub-programme [on-line]. Plymouth: Marine Biological Association of the United Kingdom. [cited 15/03/2010]. Available from: <<http://www.marlin.ac.uk/speciesfullreview.php?speciesID=4156>>



## Sandeels

There are several species of sandeel around the British Isles including *Ammodytes marinus*, typically found in water deeper than 20 m, and *Ammodytes tobianus* which occurs shallower, from the intertidal to about 20 m. Sandeels are tied very closely to their habitat of rippled sand but habitat areas can be very large. The sandeel is an important food species for many predators including seabirds which prey on the species in deeper water. Declines in seabird breeding success have been related to local declines in abundance of sandeels (Frederiksen *et al.*, 2005).

These are commercially important species, targeted by industrial fishing for oil, animal feed and fertiliser in the North Sea and, to a lesser extent, in the west of Scotland. A small coastal fishery off Shetland has experienced a number of severe declines that were primarily linked to climate (Wright, 1996; Proctor *et al.*, 1998). Declines off the North-East Scottish coast have been linked to a combination of overfishing and the effects of climate change (Frederiksen *et al.*, 2005). All the fisheries are very highly managed, but this takes no account of species (up to 5 species of sandeel may be grouped). Typically *A. marinus* accounts for over 90% of catch however. Important coastal areas are to the west of Scotland, around Shetland and the east coast, although offshore areas are generally more important than inshore areas. The Shetland population is in a cycle of recovery and collapse and is no longer economically viable. The species complex is not currently in decline, although *A. marinus* is considered under threat from both anthropogenic and climate change/ environmental factors, whilst *A. tobianus* is only under threat from climate change/ environmental factors. There is currently a closed area off the east coast of Scotland.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Sandeels	<i>Ammodytes marinus</i> , <i>Ammodytes tobianus</i>	11

### References:

- Frederiksen M, Wright PJ, Harris MP, Mavor RA, Heubeck M, Wanless S (2005) Regional patterns of kittiwake *Rissa tridactyla* breeding success are related to variability in sandeel recruitment. *Marine Ecology-Progress Series* **300**:201-211
- Proctor R, Wright PJ, Everitt A (1998) Modelling the transport of larval sandeels on the north-west European shelf. *Fisheries Oceanography* **7**:347-354
- Wright PJ (1996) Is there a conflict between sandeel fisheries and seabirds? A case study at Shetland. In: *Greenstreet SPR, Tasker ML (eds) Aquatic predators and their prey*. Fishing News Books, Blackwell Science, Oxford, p 154-165

### **Sand goby**

The sand goby *Pomatoschistus minutus* is widespread in coastal waters around the British Isles, living on sandy or muddy bottoms to depths of about 20 m, but occasionally as deep as 60-70 m. It is common in sea lochs and is usually present in estuaries, lagoons and salt marshes.

The British Isles have an estimated 70% of the European population of the species and approximately 60% of the global population. The Scottish populations are considered to be globally important. *P. minutus* has functional importance as a food source for species of larger fish, seals and birds.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Sand goby	<i>Pomatoschistus minutus</i>	11

### **Whiting (juveniles)**

The whiting *Merlangius merlangus* is a benthopelagic species, usually found at depths of 30-100 m, which occurs off western Scotland, south-east England and the English Channel, and in the Irish Sea (Barnes, 2008). Scottish territorial waters are considered to be regionally important for this species.

Juveniles in particular are found inshore (Tobin *et al.*, 2010) and are very common in the Scottish sea lochs; however, west coast populations are severely depleted. Whiting is a relatively important predator in inshore areas.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Whiting ( <i>juveniles</i> )	<i>Merlangius merlangus</i>	11

#### References:

Barnes, M., 2008. *Merlangius merlangus*. Whiting. Marine Life Information Network: Biology and Sensitivity Key Information Sub-programme [on-line]. Plymouth: Marine Biological Association of the United Kingdom. Available from: <http://www.marlin.ac.uk/speciesinformation.php?speciesID=3794>

Tobin D, Wright, P.J., Gibb, F.M., Gibb, I.M., 2010. The importance of life stage to population connectivity in whiting (*Merlangius merlangus*) from the northern European shelf. *Marine Biology* **157**:1063-1073

## **Basking shark**

The basking shark *Cetorhinus maximus* is a cosmopolitan migratory species usually sighted in summer along the west coasts of the British Isles including western Scotland, where sightings peak around August. Movements are thought to be migratory and in response to their zooplankton food source. Recent effort-corrected data shows populations in Scottish waters could be greater than in other parts of the UK. Areas on the west coast seem to be important for basking sharks with large aggregations of this species potentially using the area as a breeding ground (Speedie *et al.* 2009)

This species has been heavily exploited on a global scale over several centuries. Although the assessment of population trends has proved difficult, it is thought that their biology and site-faithfulness make basking sharks particularly vulnerable to over-exploitation. Some directed fisheries have seen catch declines of 50% to over 80% within a decade. There has been no subsequent population recovery, indicating that there is little or no migration of individuals from other areas (Saunders, 2004).

Globally, the status of the basking shark is assessed as vulnerable, but the North-East Atlantic sub-population is currently considered to be endangered (2000 IUCN Red List of Threatened Species). The basking shark has been protected within UK territorial waters under the Wildlife and Countryside Act (1981) since 1998, and is listed as a UK BAP species. It also has CITES protection under the Berne convention.

Whilst protection has removed fishing pressure, the species is now suffering from its status as a tourist attraction. Direct harassment from a curious public is an increasing threat. Collisions with boats are not unusual and, although illegal in the UK, naive but deliberate disturbance is increasingly common (Marine Conservation Society, 2009).

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Basking shark	<i>Cetorhinus maximus</i>	11

### References:

- Marine Conservation Society., 2009. *Basking sharks*. Web publication: <http://www.mcsuk.org/marineworld/baskingsharks/welcome>
- Saunders, G., 2004. Scottish Natural Heritage Information Note Series. Natural Heritage Trends. The Marine Environment: Basking Shark. Published on line [http://www.snh.org.uk/trends/trends\\_notes/pdf/Marine%20species/Basking%20shark.pdf](http://www.snh.org.uk/trends/trends_notes/pdf/Marine%20species/Basking%20shark.pdf)
- Sims, D.W. (2008) Sieving a living: A review of the biology, ecology and conservation status of the plankton-feeding basking shark *Cetorhinus maximus*. *Advances in Marine Biology* **54**: 171-220.
- Speedie, C.D., Johnson, L. A., Witt, M.J., 2009. Basking Shark Hotspots on the West Coast of Scotland: Key sites, threats and implications for conservation of the species. SNH Commissioned Report No.339

## Common skate


The common skate *Dipturis batis* is now considered to be split provisionally into two separate species, the blue skate (*Dipturus* cf. *flossada*) and the flapper skate (*Dipturus* cf. *intermedia*). As fisheries data have treated the two species as one for many years, it is appropriate for the purposes of this list to class the common skate as a species complex.

The common skate is the largest European rajid and was once an abundant constituent of the demersal fish community of north-western Europe. At the start of the 20<sup>th</sup> century it was widely distributed over the shallower waters of the continental shelf surrounding the British Isles, particularly in the north and west. Since then, fisheries data indicate that populations have undergone an extremely high level of depletion in the central part of its range around the British Isles. It is now absent from most inshore areas, and is confined to north-west Shetland and the Celtic Sea. Common skate have disappeared from areas such as the Mediterranean and the English Channel (Wearmouth and Sims, 2009). It is thought that skate form discrete local populations with little mixing between groups. Tagging exercises have demonstrated that females can exhibit extreme site fidelity and this may explain extinctions in particular geographical areas. Behaviour of this nature would also limit the species' capacity to recolonise areas from which they have disappeared (Wearmouth and Sims, 2009).

Common skate are caught as a bycatch of multispecies trawl fisheries, which cover much of their shelf and slope habitat; the large body size renders the fish catchable by fishing gear even from birth. The species' life history and demography allow little capacity to withstand exploitation, and as fishing pressure on this species complex is unlikely to be reduced in the future, it has been assessed by the IUCN as Critically Endangered throughout its range. *D. batis* is listed under the UK Biodiversity Action Plan and on the OSPAR Annex V list of threatened and/or declining species and habitats. As a significant proportion of the UK population is in Scottish waters, Scotland has a particular responsibility for this species.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Common skate	Formerly <i>Dipturis batis</i> now split provisionally into <i>D. cf. flossada</i> and <i>D. cf. intermedia</i>	11

### References:

- Dulvy, N.K., Notobartolo di Sciara, G., Serena, F., Tinti, F. & Ungaro, N., Mancusi, C. & Ellis, J. 2006. *Dipturus batis*. In: IUCN 2009. *IUCN Red List of Threatened Species. Version 2009.1*. <[www.iucnredlist.org](http://www.iucnredlist.org)>.
- Wearmouth, V.J., Sims, D.W., 2009. Movements and behaviour patterns of critically endangered common skate *Dipturus batis* revealed by electronic tagging. *Journal of Experimental Marine Biology and Ecology* **380**: 77-87. 

## **Spiny dogfish**

The spiny dogfish or spurdog, *Squalus acanthias*, has a global distribution with a single stock in the North-East Atlantic. They are distributed around the rest of the UK but Scottish populations are probably of national importance. The migration patterns of spiny dogfish are complicated and not well understood. It is therefore unclear exactly what proportion of mature and/or juvenile populations occur in Scottish waters as opposed to UK waters. However, historically there have been significant numbers in Scottish territorial waters at particular times of the year.

The spiny dogfish is on the IUCN red list as critically endangered in the North-East Atlantic (vulnerable/ endangered elsewhere in Europe).

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Spiny dogfish	<i>Squalus acanthias</i>	11

## **Bottlenose dolphin**

Bottlenose dolphins, *Tursiops truncatus*, are found worldwide in both temperate and tropical waters. There is a well-studied population of bottlenose dolphins in the Moray Firth which ranges down the east coast of Scotland, with individuals being sighted as far south as the Firth of Forth and sometimes Northumberland. There are also regular bottlenose dolphin sightings in the Inner Hebrides and around Barra. Around the British Isles, other resident populations are known from Cardigan Bay in west Wales and the west coast of Ireland (Reid *et al.*, 2003). Bottlenose dolphins have also been recorded off the south and south-west coasts of England and in the Irish Sea. Scottish territorial waters are considered to be regionally important. Bycatch, water pollution, nautical recreation and increased competition with other top predators due to changes in prey availability and distribution are likely to be the greatest threats to this species (JNCC, 2007). In the Moray Firth noise pollution and coastal development are additional pressures for bottlenose dolphin.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Bottlenose dolphin	<i>Tursiops truncatus</i>	12

### References:

Joint Nature Conservation Committee, 2007. Second Report by the UK under Article 17 on the implementation of the Habitats Directive from January 2001 to December 2006. Peterborough: JNCC. Available from: [www.jncc.gov.uk/article17](http://www.jncc.gov.uk/article17)

Reid, J.B., Evans, P.G. H and Northridge, S.P., 2003. *Atlas of Cetacean distribution in north-west European waters*. Joint Nature Conservation Committee, Peterborough.

## **Harbour porpoise**

The harbour porpoise, *Phocoena phocoena*, is the most abundant small cetacean in the North-East Atlantic (Reid *et al.*, 2003). The number of harbour porpoises in Hebridean waters is amongst the highest in Europe. Bycatch by various fishing gears, especially bottom-set gillnets, is the largest anthropogenic threat to this species in UK waters (JNCC, 2007). Other threats include chemical and noise pollution, boat traffic, and lack of food.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Harbour porpoise	<i>Phocoena phocoena</i>	12

### References:

Joint Nature Conservation Committee, 2007. Second Report by the UK under Article 17 on the implementation of the Habitats Directive from January 2001 to December 2006. Peterborough: JNCC. Available from: [www.jncc.gov.uk/article17](http://www.jncc.gov.uk/article17)

Reid, J.B., Evans, P.G. H and Northridge, S.P., 2003. *Atlas of Cetacean distribution in north-west European waters*. Joint Nature Conservation Committee, Peterborough.

## Killer whale

The killer whale, *Orcinus orca*, is probably the most cosmopolitan of all cetaceans. Killer whales can be seen in any marine region, and they have even been known to travel up rivers. Although they are found in all oceans and seas, in both hemispheres, they appear to be more common in nearshore, cool temperate to subpolar waters. Whilst not considered common, killer whales are regularly seen around the Shetland Islands, and the north and west of Scotland (Reid *et al.*, 2003). In the UK, killer whales are considered scarce outside Scotland. Threats include disturbance from tourism operations, noise disturbance, pollution and disease (JNCC, 2007). Studies of coastal populations off British Columbia found that killer whales contain very high levels of contaminants compared to any other cetacean worldwide; the full effect these contaminants are likely to have on populations is not known. Declining food stocks may also be a pressure. Although killer whales are fairly abundant and widespread on a global scale, regional populations can be small and highly specialised, and therefore vulnerable to over-exploitation and habitat deterioration.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Killer whale	<i>Orcinus orca</i>	12

### References:

- Joint Nature Conservation Committee, 2007. Second Report by the UK under Article 17 on the implementation of the Habitats Directive from January 2001 to December 2006. Peterborough: JNCC. Available from: [www.jncc.gov.uk/article17](http://www.jncc.gov.uk/article17)
- Reid, J.B., Evans, P.G. H and Northridge, S.P., 2003. *Atlas of Cetacean distribution in north-west European waters*. Joint Nature Conservation Committee, Peterborough.

## Minke whale

The minke whale, *Balaenoptera acutorostrata*, is a cosmopolitan species which typically exploits rich polar or temperate waters in summer, all the way to the edges of the pack ice. In winter, most minke whales move to warmer equatorial waters, migrating thousands of kilometres. At least three distinct geographical populations are recognised, one of which is the North Atlantic population. In the UK, minke whales are found mainly in the north and west; they are widespread throughout Scottish waters. There are thought to be approximately 120,000 minke whales in the North-East Atlantic, but this stock has been reduced by whaling to an estimated 45–70% of its pre-exploitation level of abundance and the species continues to be hunted commercially by Norway. Other threats include noise and entanglement in marine litter, incidental catch in fisheries and ship strikes (JNCC, 2007).

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Minke whale	<i>Balaenoptera acutorostrata</i>	12

### References:

Joint Nature Conservation Committee, 2007. Second Report by the UK under Article 17 on the implementation of the Habitats Directive from January 2001 to December 2006. Peterborough: JNCC. Available from: [www.jncc.gov.uk/article17](http://www.jncc.gov.uk/article17)

Reid, J.B., Evans, P.G. H and Northridge, S.P., 2003. *Atlas of Cetacean distribution in north-west European waters*. Joint Nature Conservation Committee, Peterborough.



## **Risso's dolphin**

Risso's dolphins, *Grampus griseus*, are found in both temperate and tropical waters. The Risso's dolphin is usually considered to be a shelf-edge and/or deep water species, but in the UK it is most abundant in shelf waters around Scotland and in the Irish Sea (Reid *et al.*, 2003). The main concentration in Scottish territorial waters is around the Hebrides with other records from the Northern Isles and the east coast of Scotland. The species is thought to be under threat from professional fishing (bycatch), water pollution, and parasitism (JNCC, 2007). Further pressures include oil and gas exploration, other industrial development and noise pollution.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Risso's dolphin	<i>Grampus griseus</i>	12

### Reference:

Joint Nature Conservation Committee, 2007. Second Report by the UK under Article 17 on the implementation of the Habitats Directive from January 2001 to December 2006. Peterborough: JNCC. Available from: [www.jncc.gov.uk/article17](http://www.jncc.gov.uk/article17)

Reid, J.B., Evans, P.G. H and Northridge, S.P., 2003. *Atlas of Cetacean distribution in north-west European waters*. Joint Nature Conservation Committee, Peterborough.

### **Short-beaked common dolphin**

The short-beaked common dolphin, *Delphinus delphis*, occurs throughout the North-East Atlantic. It is a frequent visitor to the west coasts of Britain and Ireland. The species is found in continental shelf waters and along the shelf edge, especially the Celtic Sea, the western approaches to the English Channel and off south and west Ireland (Reid *et al.*, 2003). The short-beaked common dolphin is seen in Hebridean waters and the North Sea in the summer months. It has a northern limit of regular distribution around the Shetland Islands. It is a highly gregarious species which lives in large pods. The short-beaked common dolphin is a common incidental catch in the world-wide pelagic purse-seine and drift net fisheries, which occur predominantly outside Scottish territorial waters. Other threats include noise and pollution (JNCC, 2007).

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Short-beaked common dolphin	<i>Delphinus delphis</i>	12

#### Reference:

Joint Nature Conservation Committee. 2007. Second Report by the UK under Article 17 on the implementation of the Habitats Directive from January 2001 to December 2006. Peterborough: JNCC. Available from: [www.jncc.gov.uk/article17](http://www.jncc.gov.uk/article17)

Reid, J.B., Evans, P.G. H and Northridge, S.P., 2003. *Atlas of Cetacean distribution in north-west European waters*. Joint Nature Conservation Committee, Peterborough.

## White-beaked dolphin

White-beaked dolphins, *Lagenorhynchus albirostris*, are found in cold, temperate waters of the North-East Atlantic including around the UK, Iceland the Norwegian Sea and north to Svalbard (Reid *et al.*, 2003). Shelf waters around Scotland are the main stronghold of the species, both in the UK and Europe. The species is generally abundant and not considered to be in severe decline although there are few data available to assess trends. The 2005 SCANS survey estimated a total of 22,700 white-beaked dolphins in the North Sea and European Atlantic shelf waters. Incidental catches in fishing gear do occur but are not thought to represent a major threat to this species. Direct catch also occurs as hunting still continues in some areas, notably south-west of Greenland. Other threats to this species include noise and water pollution (JNCC, 2007)

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
White-beaked dolphin	<i>Lagenorhynchus albirostris</i>	12

### Reference:

Joint Nature Conservation Committee, 2007. Second Report by the UK under Article 17 on the implementation of the Habitats Directive from January 2001 to December 2006. Peterborough: JNCC. Available from: [www.jncc.gov.uk/article17](http://www.jncc.gov.uk/article17)

Reid, J.B., Evans, P.G. H and Northridge, S.P., 2003. *Atlas of Cetacean distribution in north-west European waters*. Joint Nature Conservation Committee, Peterborough.

## Harbour/common seal

Harbour or common seals, *Phoca vitulina*, in Europe belong to a distinct sub-species. 30% of European harbour seals are found in the UK although this proportion has declined from approximately 40% in 2002. Combining the most recent counts (2006-2008) at all sites, approximately 25,650 harbour seals were counted in the UK, 79% of these in Scotland (SCOS, 2010). The count represents approximately 60-70% of the total population leading to an estimate for the total British population of 40,000-46,000 individuals. Harbour seals are widespread around the west coast of Scotland and throughout the Hebrides and Northern Isles. On the east coast, their distribution is more restricted with concentrations in the major estuaries of the Firth of Tay and the Moray Firth. Major declines have now been documented in harbour seal populations around Scotland with declines of up to 50% since 2000 in Orkney, Shetland, the Moray Firth and the Firth of Tay. The cause of the declines in Scotland is not confirmed. More generally, however, threats to harbour seals include commercial fishing and disease (JNCC, 2007). Seals are also sensitive to a number of other anthropogenic pressures including anti-predator shooting at fish farms, bioaccumulation of toxic compounds and noise pollution.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Harbour/common seal	<i>Phoca vitulina</i>	12

### References:

- Joint Nature Conservation Committee, 2007. Second Report by the UK under Article 17 on the implementation of the Habitats Directive from January 2001 to December 2006. Peterborough: JNCC. Available from: [www.jncc.gov.uk/article17](http://www.jncc.gov.uk/article17)
- Special Committee on Seals (SCOS). 2010. Scientific Advice on Matters Related to the Management of Seal Populations: SCOS Main Advice 2010. Available from: <http://www.smru.st-andrews.ac.uk/pageset.aspx?psr=411>

## **Grey seal**

There are three main stocks of the grey seal *Halichoerus grypus* - the western Atlantic stock centered in north-east North America; the eastern Atlantic stock, split between Iceland, Faeroe Islands, Norway, the UK & Ireland; and the Baltic Sea stock.

Approximately 45% of the world's grey seals breed in the UK and 90% of these breed at colonies in Scotland. The Scottish breeding grounds are therefore considered globally important. In Scotland, the main breeding concentrations are in Orkney and the Outer Hebrides, but colonies are also present in Shetland and along the east coast, most notably Isle of May and Fast Castle Head. The UK grey seal population for 2009 was estimated at 119,400 (95% CI 92,500 – 156,200) (SCOS, 2010).

Grey seals may be considered a dominant predator in the UK, feeding on a variety of fish species such as sandeels, whitefish (e.g. cod, haddock, whiting, ling), and flatfish.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Grey seal	<i>Halichoerus grypus</i>	12

### References:

Special Committee on Seals (SCOS). 2010. Scientific Advice on Matters Related to the Management of Seal Populations: SCOS Main Advice 2010. Available from: <http://www.smru.st-andrews.ac.uk/pageset.aspx?psr=411>

## Otter

Historically otters, *Lutra lutra*, occurred over most of the UK and were widespread in Europe, but populations declined sharply during the 1960s and 1970s due to hunting and habitat loss and, more recently, the impact of toxic organochlorine insecticides. At present, the majority of the otter population in Britain is in Scotland, with a significant proportion of this number being found in the north and west of the country. Other strong populations survive in Wales and Ireland. The otter is still scarce over much of England, where the highest concentrations are in the south-west. However, recent surveys suggest that the otter population is recovering well and recolonising parts of its former range and the SNH Trends publication (Green and Green, 2004) shows otter numbers increasing in Scotland.

Included features Common name or Biotope name	Scientific name or Biotope code	Spreadsheet number
Otter	<i>Lutra lutra</i>	12

### Reference:

Green, R. and Green, J. 2004. Scottish Natural Heritage. Information Note Series. Natural Heritage Trends. Fresh waters: Eurasian Otter (*Lutra lutra*). Published on line [http://www.snh.org.uk/trends/trends\\_notes/pdf/Freshwater%20species/Eurasian%20otter.pdf](http://www.snh.org.uk/trends/trends_notes/pdf/Freshwater%20species/Eurasian%20otter.pdf)

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