The Seasearch Biotope Key

A key for matching Seasearch records
to sublittoral biotopes and biotope complexes

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This document has been produced as part of a contract between the Joint Nature Conservation Committee and the Marine Conservation Society on behalf of Seasearch.

The first draft of this key was prepared by Robert Irving in June 2007. Following testing by Seasearch data entry personnel, the document was substantially revised and the second draft was prepared by Chris Wood. The final document incorporates comments received from consultees on both previous drafts.

The aim of the Key is to assist Seaseach coordinators and dta entry personnel with the allocation of JNCC biotopes to Seasearch Survey data.

Seasearch is a volunteer underwater survey project for recreational divers to record observations of marine habitats and the life they support. The information gathered is used to increase our knowledge of the marine environment and contribute towards its conservation. Seasearch is coordinated on behalf of the Seasearch Steering Group which comprises representatives of the following organisations:

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1. INTRODUCTION

This Key has been put together to provide Seasearch data entry personnel a key to assigning biotope codes to Seasearch survey data based on the Joint Nature Conservation Committee (JNCC)'s Marine Habitat Classification published in 2005[1]. This document (from this point on referred to as the 'Biotope Manual') is available on JNCC's website, and can be downloaded and printed as three separate volumes (Infralittoral Rock; Circalittoral Rock; and Sublittoral Sediments). It is important to stress that this Key is an additional aid to identifying biotopes. It is intended to be used in conjunction with the JNCC website and is produced in hard copy so that both sources can be consulted at the same time. The full Biotope Descriptions on the website should always be referred to check the biotopes identified using this key.

The main aim of this Key is to help Seasearch data entry personnel (and possibly the more experienced Seasearch Surveyors) with allocating biotope information to the habitat descriptions given on the Seasearch Survey forms. In addition, it is hoped that the Key will provide a greater understanding of how the biotope classification has been constructed and can be used.

In its introduction to the Biotope Classification, the JNCC web site states that:

> A greater understanding of the distribution, extent and status or quality of marine habitats is required to facilitate the protection of threatened and rare habitats and, more generally, the assessment of the state of the marine environment. Such information is also needed to improve spatial and strategic planning of human activities, in particular to promote the wiser use of habitats where there are competing demands (e.g. fishing, sand and gravel extraction, wind energy generation, nature conservation). As such, information on marine habitats needs to play a major role in the ecosystem-based approach to management of the marine environment that is now widely advocated at national and international levels (Defra 2002; North Sea Conference 2002).
>
> This habitat classification has, consequently, been developed as a tool to aid the management and conservation of marine habitats. It provides an ecologically-based classification of [seashore and] seabed features, aimed primarily at classifying benthic communities of invertebrates and seaweeds in a way which is meaningful both to detailed scientific application and to the much broader requirements for management of the marine environment. The classification is relevant to the habitat requirements of more mobile species, such as fish and marine mammals, but these are not its primary focus.

JNCC's Marine Habitat Classification has been widely adopted as the accepted means of classifying marine biotopes in Britain and Ireland. The Classification can be used at various levels/degrees of detail/habitat depending upon the quality of the information available. What has become apparent, however, is that the Classification is not that straightforward to use (in terms of identifying the correct biotope for any particular habitat/community), even by professional marine biologists in the field!

JNCC's Marine Habitats Team is keen to make the most use of the data generated by Seasearch Surveyors. Seasearch dives may be undertaken in places where no other records exist of the seabed types and the species associated with them. Consequently, these records are potentially of great value to JNCC. However, as much of JNCC's seabed mapping is based upon their Habitat Classification, the habitat information

[1] The complete Marine Habitat Classification is available to view and download from the internet (www.jncc.gov.uk/marine/marine habitat classification). *Ref*. David W. Connor, James H. Allen, Neil Golding, Kerry L. Howell, Louise M. Lieberknecht, Kate O. Northen and Johnny B. Reker (2004). *The Marine Habitat Classification for Britain and Ireland Version 04.05* JNCC, Peterborough ISBN 1 861 07561 8 (internet version).

produced by Seasearch Surveyors is of limited use unless biotopes (or biotope complexes) can be allocated to the habitat and species data. The allocation of biotopes allows for the standardisation of all seabed biological data which can then be compared on a national basis.

2. MAKING SENSE OF BIOTOPES

2.1 What is a biotope?

A biotope can be defined as “the physical habitat with its biological community; [essentially], it refers to the combination of physical environment (habitat) and its distinctive assemblage of conspicuous species” (Hiscock, 1996 – see Appendix 1).

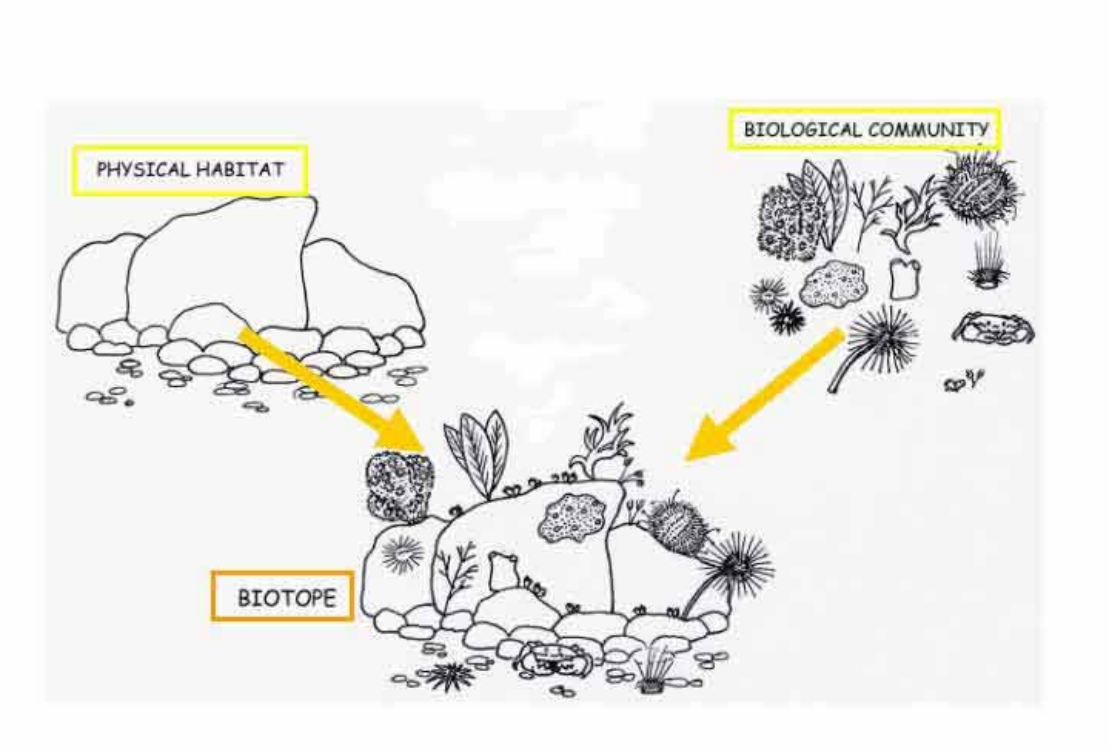

Fig. 1 Diagram illustrating the two main components of a biotope: the physical habitat and the biological community. Note that the composition of the community (i.e. the species present) is influenced by a number of environmental conditions such as wave exposure, tidal streams, turbidity, silt, scour etc.

The minimum area of seabed which can be assigned a biotope is 5m x 5m (or, for the purposes of Seasearch dives, approximately room size).

There are a total of 182 sublittoral biotopes recognised in the Biotope Manual (04.05) They are not all included in this key as a number either occur in situations which are unlikely to be encountered on Seasearch dives, e.g. offshore (> 40m deep) sediments or shallow lagoons, are rarely recorded or are based on species unlikely to be recorded by Seasearch surveyors. Where biotopes have been omitted the key identifies the fact.

2.2 Biotope codes

Biotopes are referred to by their title (a concise summary of the characteristic species and/or genera, the biological zone and the seabed type), or, as a form of short-hand, by a code. The code utilises a sequence of letters separated by full stops. Each sequence (or element) relates to a level of the classification hierarchy. For example:

CR.HCR.XFa.ByErSp

An explantion of what this particular code string represents is given in section 2.3 below. A number of rules are followed when biotopes codes are being allocated by JNCC. As interesting background information these are set out below, but you may find this a bit heavy going…

1 Broad habitat and main habitat codes are based on habitat factors or gross biological features (e.g. macrophytes and biogenic reefs).

2 Biotope complex, biotope and sub-biotope codes are based wherever possible upon the most characteristic taxa (which preferably also dominate spatially/numerically) (preferably no more than two per biotope complex, biotope or sub-biotope).

3 Where the biological composition is too complex to derive a simple code, features of the habitat are used (e.g. VS for variable salinity).

4 Codes for habitat factors, higher taxa and descriptive community features (e.g. park, crustose) are derived from a standard lexicon [a shortened form of this is given in Appendix 1]. The full list of codes used is contained in the hierarchical list which can be downloaded from the classification website.

5 Codes for names of genera are derived using the first three letters of a genus or higher taxon name (e.g. Ala for ***Ala**ria*, Chr for **Chr**ysophyceae). Codes for species names are derived using the first letter of the genus and the first three letters of the specific name (e.g. Ldig for ***L**aminaria **dig**itata*).

6 Within the code each new element of the code starts with a capital letter.

7 As far as practical the code elements are unique, but some duplication is adopted in the interests of keeping codes short. The code for any given type (i.e. for the level defined, regardless of whether it is stringed with higher codes – see below) is always unique.

8 All the biotope/sub-biotope codes are unique, so users familiar with the classification can refer to individual biotopes using only the codes for these levels in the hierarchy.

9 The full codes are compiled using the code for each level in the hierarchy, separated from the next level by a full stop, starting with the broad habitat (level 2), followed by the main habitat, biotope complex, biotope and sub-biotope.

A complete list of **all** the sublittoral biotopes, featuring their titles and codes, is in the JNCC website and is not repeated here.

2.3 Building up the code

The biotope code is built up as a series of steps, each step relating to a different hierarchical level, of which there are six in total (see the Table overleaf). For Seasearch purposes, we are keen to allocate (as a *minimum* requirement) a **biotope complex** to the habitat description given on a Survey form, but where possible, a **biotope** should be allocated too. (Note that on some forms there will simply not be sufficient information for a biotope to be allocated).

	Category	Code	Title
level 1	'environment'	Marine	Alternatives: terrestrial or freshwater
level 2	'broad habitats'	CR	Circalittoral Rock
level 3	'main habitats'	CR.HCR	High Energy Circalittoral Rock
level 4	'biotope complexes'	CR.HCR.XFa	Mixed faunal turf communities
level 5	'biotopes'	CR.HCR.XFa.ByErSp	Bryozoan turf and erect sponges on tide-swept circalittoral rock
level 6	'sub-biotopes'	CR.HCR.XFa.ByErSp.DysAct	Mixed turf of bryozoans and erect sponges with *Dysidea fragilis* and *Actinothoe sphyrodeta* on tide-swept, wave-exposed circalittoral rock

The biotope code uses a short-hand in order to keep it (relatively!) short. For ease of identifying what the code refers to, Appendix 1 provides transcriptions of a number of the short-hand words. A full code 'lexicon' (including codes from the littoral classification as

well) is given on the JNCC website. You should note that the species abbreviations are not the six letter ones used when entering species data into Marine Recorder.

2.4 Broad Habitats

Throughout the Key, reference is made to the various biological zones which the sublittoral is divided into. It is important to understand these and where they lie in relation to one another (see Fig.2 below).

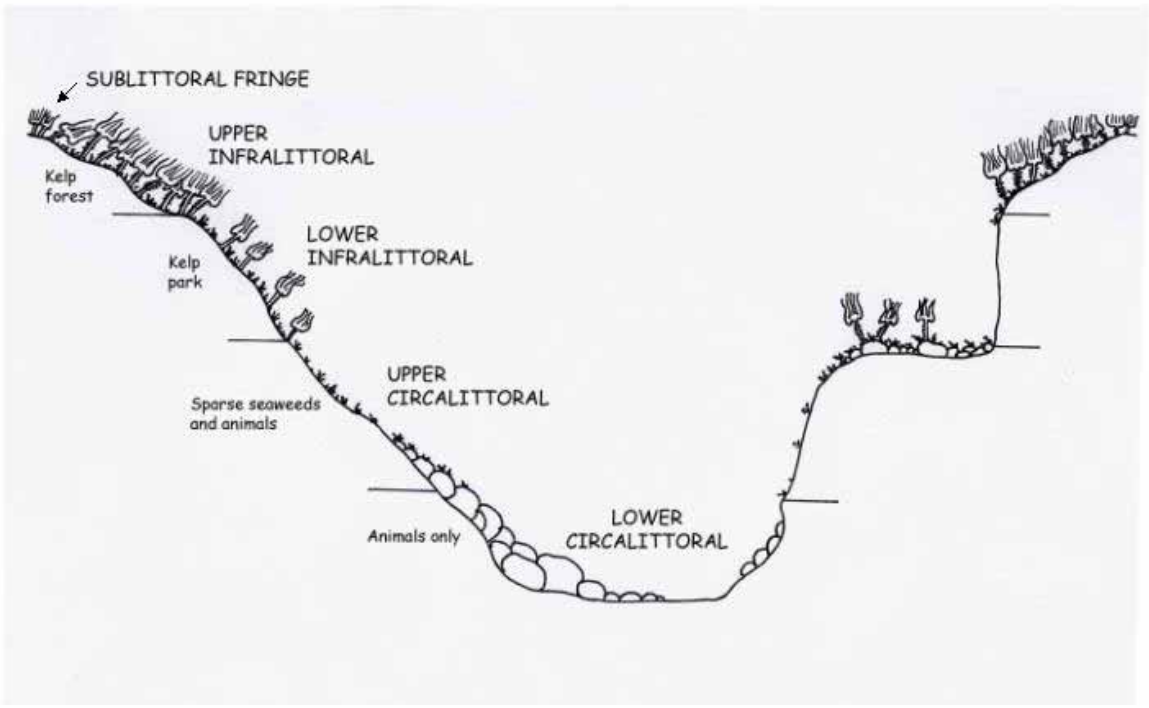

Fig. 2 Diagram showing the various biological zones in the sublittoral. The depth range of each zone will vary depending on the clarity/turbidity of the water. (For instance, at St Kilda (60km west of the Outer Hebrides) kelp has been recorded growing at 46m! By contrast, off the Kent coast, the odd kelp plants that are present are rarely found deeper than 2m depth.)

If the underlying substratum is rock or boulders, then it should be possible to identify whether the habitat is within the **Infralittoral** (kelp typically present, either as kelp forest or kelp park) or the **Circalittoral** (sparse seaweeds present in the upper circalittoral but completely absent in the lower circalittoral). However, this will depend on the recording capabilities of the Surveyor – there has been at least one instance where *Laminaria digitata* has been (mistakenly) recorded at 18m depth, making for a very extensive sublittoral fringe! If the substratum is neither bedrock nor boulders, try the **Sublittoral Sediment** category.

2.5 Main Habitats

Within the Infralittoral and Circalittoral rock sections, the Main Habitat sub-divisions are determined by the level of energy (wave exposure or tidal streams) affecting the site. Historically, this information has not been included on the Survey form, but this is likely to change with a new form to be used in 2008. It is up to the person validating the forms (i.e. the person checking they have been completed correctly) or the data verifier (i.e. the person entering the data onto the database) to complete this assessment of exposure.

The degree of **wave exposure** takes into account the aspect of the adjacent coast (related to the direction of prevailing or strong winds); the fetch (the distance to the nearest land); the degree of open water offshore; and the depth of water adjacent to the coast. Usually, determining the wave exposure at a given site requires inspection of charts or maps. The definitions of the categories below are taken from the MNCR Survey Form Guidance Notes.

Extremely exposed	This category is for the few open coastlines which face into prevailing wind and receive oceanic swell without any offshore breaks (such as islands or shallows) for several thousand kilometres and where deep water is close to the shore (50m depth contour within about 300m, e.g. Rockall).
Very exposed	Open coasts which face into prevailing winds and receive oceanic swell without any offshore breaks (such as islands or shallows) for several hundred kilometres, but where deep water is not close (>300 m) to the shore.
Exposed	Prevailing wind onshore although there is a degree of shelter because of extensive shallow areas offshore, offshore obstructions, or a restricted (<90°) window to open water. Not generally exposed to strong or regular swell. Can also include open coasts facing away from prevailing winds but where strong winds with a long fetch are frequent.
Moderately exposed	Generally includes open coasts facing away from prevailing winds and without a long fetch but where strong winds can be frequent.
Sheltered	Restricted fetch and/or open water window. Coasts can face prevailing winds but with a short fetch (say <20 km) or extensive shallow areas offshore or may face away from prevailing winds.
Very sheltered	Unlikely to have a fetch greater than 20 km (the exception being through a narrow [<30°] open water window). Face away from prevailing winds or have obstructions, such as reefs, offshore.
Extremely sheltered	Fully enclosed with fetch no greater than about 3 km.
Ultra sheltered	Sites with fetch of a few tens or at most 100s of metres.

Tidal streams - this refers to the maximum current strength at the surface during spring tides, which affects the actual area surveyed. It does **not** relate to the strength of the current during your dive (see paragraph below). The categories are:-

Very strong	> 6 knots (> 3 m/sec.)
Strong	> 3-6 knots (1.5-3 m/sec.)
Moderately strong	1-3 knots (0.5-1.5 m/sec.)
Weak	< 1 knot (< 0.5 m/sec.)
Very weak	negligible

Current strengths are given on Admiralty charts as tidal diamonds (keyed elsewhere on the chart), though it is uncommon to have a direct record for the site being surveyed and you may have to extrapolate considerably.

Tidal streams tend to be negligible at some point during the tidal cycle. It is during this period of time, known as 'slack water', when dives tend to take place! Consequently, an interpretation by the diver of the strength of the tidal stream affecting the dive site may be that it was negligible and of low energy. Be wary of this!

3. HOW TO USE THIS KEY

3.1 Read me first…

This key should allow you to assign some level of habitat/biotope classification to the information given on the Survey Form. Before you try to do this however, please note the following provisos:

1. Sometimes it is very difficult to get an exact match between what is described on the Seasearch form and what is described in the Biotope Manual. Where this is the case, it is better to be less precise (by going up a level in the classification hierarchy) than to decide on a biotope which you consider not to be a good match. In other words, it is better to assign a biotope complex rather than a biotope (or even sub-biotope). Remember: DO NOT TRY TO FIT SQUARE PEGS INTO ROUND HOLES!
2. Just to re-emphasise this point, it is far better to give less precise but accurate detail, than to give precise but inaccurate detail. Try not to fall into the trap of saying, "Well, such-and-such a species is present so it *must* be this biotope." The chances are that the species in question is featured in a number of biotopes at different abundances.
3. If you are unsure, go back a step.
4. Some biotopes are known to be very tricky to assign – for instance those where the kelp *Laminaria hyperborea* predominates. Great care should be taken in these instances, and if you have any doubts, opt for the biotope complex.

The key is designed to be used in conjunction with the JNCC website. This contains detailed descriptions of each biotope complex, biotope or sub-biotope in a common format.

3.2 How the key works

The first part of the key is designed to locate the correct ***broad habitat*** (i.e. Infralittoral Rock, Circalittoral Rock or Sublittoral Sediment). This is not always as straightforward as it may seem and sometimes surveyors identify as habitats seabed that falls within more than one broad habitat. If that happens you will need to split the sample and enter two codes, one for each part.

You then go to the relevant broad habitat section and work through the key. The JNCC classification moves on to the ***main habitat*** at this point but we found that the overlaps between different levels of exposure and tidal streams and the main habitats made it easy to lose the plot and consequently the key often follows a different path related to the seabed cover types and species assemblages that are likely to feature on Seasearch Survey forms. We hope this will make the process more straightforward. At some point you will have to decide if you are looking at muddy sand or sandy mud but we try to delay that as long as possible!

3.3 Using the JNCC website

The key is designed to be used in conjunction with the Biotope Manual on the JNCC website and it is important to check the conclusion you have reached based on the key with the detailed description.

The website address is www.jncc.gov.uk and then follow the Marine > Marine Habitats > Marine Habitat Classification links. The address of the page is www.jncc.gov.uk/page-1584 at present though these things have a habit of changing.

From this page you can go to the ***search pages,*** the ***expandable hierarchy*** or the ***downloadable documents.*** We don't recommend printing out the documents unless you want to use up a lot of paper and ink!

The ***expandable hierarchy*** is a useful overview of the structure of the suite of biotopes. You can click on a biotope to view its detailed description. Because the key does not follow the hierarchy strictly it may not be immediately obvious from code you have arrived at where it sits in the hierarchy.

The ***search pages*** allow you to search by biotope code, habitat words or phrases or habitat name. If you have reached a code from the key and wish to check it type the code into the search habitat code box and click on the search button. This will take you to the detailed description for that code.

3.4 Recording the biotope

Once you have decided which biotope complex (or biotope) matches the description given on your Seasearch Survey form, you need to enter the full biotope (or biotope complex) code in the box on the Survey form. There is also an 'assessment of confidence' box too (correctly referred to as a 'biotope qualifier') – please complete this as below:

Code	*Explanation*
W	The biotope allocated covers the **W**hole of the habitat described on the Survey Form.
P	The biotope allocated covers only **P**art of the habitat described on the Survey Form.
C	The biotope allocated is an exact match to the habitat described (**C**ertain).
U	The biotope allocated is tentative and is probably not an exact match to the habitat described (**U**ncertain).

There will therefore be two letters after the code W or P depending on whether the code applies to the whole or part of the habitat identified on the form and C or U depending on how sure you are of the biotope you have identified. The revised Survey Form Biotope Code should be completed in the following format:

CR.HCR.Fat.BalTub	WU

The biotope will be entered into Marine Recorder together with all of the other data on the Survey Form. Details of how to do this are given in Section 5 (page 43) and will be incorporated into a revision of the data entry manual in due course.

4. THE BIOTOPE KEY

Using the information on seabed type, depth and the description(s) of the habitat(s) encountered on the Seasearch Survey form, work through the key below:

Broad Habitats

Previous choice box number	Box no.	KEY	Instruction
	1	Substratum composed of mud, sand, gravel, pebbles or cobbles[2], or any mixture of these……..….	……..…go to **7**
		Substratum not as described above……..….	……..…go to **2**
(1)	**2**	Substratum composed of bedrock, boulders or large cobbles, or any mixture of these, or man-made structures…….	……..…go to **3**
		Substratum not as described above……..….	……..…go to **1**
(2)	**3**	Were algae (= seaweeds) present? or if vertical or overhanging surfaces were there seaweeds on adjoining surfaces at the same depth……...	YES..…..go to **4** NO……...go to **6**
(3)	**4**	Kelp (either as kelp 'forest' or as kelp 'park') or other large brown seaweeds present (such as *Halidrys siliquosa*, *Sargassum muticum* or *Alaria esculenta*) ……	……..…go to **5**
		Seaweeds present mostly sparse foliose red algae (sometimes their true colours are difficult to see without the use of a torch) ……...	..……...go to **6**

Rock categories (includes bedrock, boulders and cobbles)

(4)	**5**	INFRALITTORAL – dominated by kelp plants, either as dense kelp 'forest' (upper infralittoral), or as sparse kelp 'park' (lower infralittoral). Extends from the sublittoral fringe to the (upper) circalittoral……	Go to Section **A** **page 10**
(3) (4)	**6**	CIRCALITTORAL – only enough light to allow the growth of red foliose algae (upper circalittoral), below which there are no algae and animals dominate (lower circalittoral). Extends from the (lower) infralittoral to 60m+……...	Go to Section **B** **page 21**

Sediment categories (includes mud, sand, gravel, pebbles and cobbles)

(1)	**7**	SUBLITTORAL SEDIMENT……	Go to Section **C** **page 33**

[2] Note that if the substratum had a high percentage of stable cobbles, then it may be that possible biotopes will be found under the 'Infralittoral rock' section (if kelp was present) or under the 'Circalittoral rock' section (if kelp was absent), rather than 'Sublittoral sediment'.

A	INFRALITTORAL ROCK	HABITAT CODE: IR

Description:

Infralittoral rock includes habitats of bedrock, boulders and cobbles which occur in the shallow subtidal zone and typically support seaweed communities. The upper limit is marked by the top of the kelp zone, whilst the lower limit is marked by the lower limit of kelp growth or the lower limit of dense seaweed growth. Infralittoral rock typically has an upper zone of dense kelp (forest) and a lower zone of sparse kelp (park), both with an understorey of erect seaweeds.

Box no.	KEY	CODE	Instruction
A1	Site ***extremely exposed*** or ***very exposed***	IR.HIR	..go to **A2**
	Site ***exposed*** or ***moderately exposed***		..go to **A3**
	Site ***sheltered***		..go to **A4**
	Site ***very sheltered*** or ***extremely sheltered***	IR.LIR	..go to **A5**
	Site comprising surge gullies and caves ***or*** seaweeds covering artificial substrata (wrecks/piers etc)	IR.FIR	..go to **A6**
A2 (A1)	***High energy infralittoral rock***	IR.HIR	
	either		
	Substratum covered with kelp or/and dabberlocks with foliose red and pink encrusting seaweeds and a range of animals such as dead men's fingers and anemones	IR.HIR.KFaR	.go to **A21**
	or		
	boulders and cobbles capable of movement or rock and boulders abraded by coarse sediment with encrusting pink algae, sugar kelp (*L. saccharina*), furbelows (*Saccorhiza*) or podweed (*Halidrys*)	IR.HIR.KSed	.go to **A22**
	if neither look at **3** or do not proceed any further		
A21 (A2)	***Kelp with cushion fauna and/or foliose red seaweeds***	IR.HIR.KFaR	
	either		
	exposed sublittoral fringe bedrock with dabberlocks (*Alaria esculenta*) forest, mussels and barnacles	IR.HIR.KFaR.Ala	go to **A211**
	or		
	Cuvie or forest kelp (*L. hyperborea*) kelp forest with foliose red seaweeds, encrusting pink algae and a mixture of soft corals, anemones and sponges	IR.HIR.KFaR.LhypFa	no more detail for this biotope
	or		
	Cuvie or golden kelp (*L. hyperborea* or *L.ochroleuca*) forest or park with foliose red seaweeds and encrusting pink algae. Less animals than above	IR.HIR.KFaR.LhypR	go to **A212**
	or		
	Dense foliose red seaweeds usually at or below kelp park with pink encrusting algae beneath	IR.HIR.KFaR.FoR	go to **A213**

A211 (A21)	***Alaria esculenta on exposed sublittoral fringe bedrock***	IR.HIR.KFaR.Ala
	Dabberlocks (*Alaria esculenta)* with mussels and enrcrusting pink algae	IR.HIR.KFaR.Ala.Myt
	Mixture of dabberlocks (*Alaria esculenta*) & oarweed (*L. digitata*) with understorey of red seaweeds and encrusting pink algae	IR.HIR.KFaR.Ala.Ldig

A212 (A21)	***Kelp forest or park with dense foliose red seaweeds***	IR.HIR.KFaR.LhypR
	either	
	Cuvie (*L. hyperborea*) kelp **forest** with foliose red seaweeds and encrusting pink algae	IR.HIR.KFaR.LhypR.Ft
	or	
	Cuvie (*L. hyperborea*) kelp **park** with foliose red seaweeds and encrusting pink algae	IR.HIR.KFaR.LhypR.Pk
	or	
	Mixed cuvie (*Laminaria hyperborea*) or golden kelp (*L. ochroleuca*) or predominantly golden kelp **forest** with foliose red seaweeds, encrusting pink algae and brown seaweeds.	IR.HIR.KFaR.LhypR.Loch
	or	
	shallow **vertical** rock communities with cuvie (*L. hyperborea*) red seaweeds and jewel anemones (*Corynactis viridis*), plumose anemones (*Metridium senile*) or elegant anemones (*Sagartia elegans*)	IR.HIR.KFaR.LhypRVt
	there are 5 sub-biotopes see JNCC site if you think you can go that far	

A213 (A21)	***Foliose red seaweeds on exposed lower infralittoral rock***	IR.HIR.KFaR.FoR
	do not proceed further unless the following applies..	
	dense foliose red seaweeds mixed with brown fan weed *(Dictyota dichotoma* and/or *Dictyopteris membranacea)*	IR.HIR.KFaR.FoR.Dic

A22 (A2)	***Sediment-affected or disturbed kelp and seaweed communities***	IR.HIR.KSed
	there a number of biotopes in this complex which are defined largely by the seaweed composition which is unlikely to be available on Seasearch forms. Proceed with caution! The following options are not comprehensive but are those you may have sufficient detail to identify. If in doubt stick at this point.	
	Winter scoured rocks, boulders and cobbles with furbelows *(Saccohiza polyschides)* and other brown and red seaweeds, limited fauna	IR.HIR.KSed.Sac
	seasonally disturbed boulders and cobbles in shallow water with mermaids tresses (*Chorda filum*) and sugar kelp (*L. saccharina*) with other red and brown seaweeds below	IR.HIR.KSed.ChoR
	bedrock and boulders, often in tide-swept areas subject to scouring or sand cover with a mixed kelp canopy and scour tolerant seaweeds below	IR.HIR.KSed.XKScrR
	continues overleaf	

	tide-swept boulders and cobbles with dense podweed (*Halidrys siliquosa*) and mixed brown and red scour tolerant seaweeds	IR.HIR.KSed.XKHal	

A3 (A1)	***High energy infralittoral rock <u>or</u>*** ***Moderate engery infralittoral rock*** Biotopes for exposed and moderately exposed sites can fall in either the High or Moderate energy classifications which makes them particularly difficult to determine. Many sites covered by Seasearch surveys will fall in this category	IR.HIR ***<u>or</u>*** IR.MIR	
	either was the site **kelp** forest or kelp park (all kelp species)		go to **A31**
	or was the main cover of foliose or filamentous **red seaweeds**		go to **A32**
	or was the habitat vertical limestone/chalk with abundant boring red nose (*Hiatella arctica*) and sponges and some red and brown seaweeds	IR.MIR.KR.HiaSw	

A31 (A3)	***Kelp communities*** what was the main kelp species?		
	Oarweed (*Laminaria digitata*)		..go to **A311**
	Cuvie or forest kelp *(Laminaria hyperborea*)		..go to **A312**
	Golden kelp (*Laminaria ochroleuca*) SW only		..go to **A313**
	Sugar kelp (*Laminaria saccharina*)		..go to **A314**
	Furbelows (*Saccorhiza polyschides*)		..go to **A315**

A311 (A31)	***Oarweed (Laminaria digitata) communities*** very shallow exposed to sheltered rock with *Laminaria digitata* forest and pink encrusting algae below.	IR.MIR.KR.Ldig	
	……..there are three sub-biotopes		..go to **A316**

A312 (A31)	**Cuvie or forest kelp *(Laminaria hyperborea*) communities** was the density of kelp:		
	Kelp forest		go to **A317**
	or **Kelp park**		go to **A318**
	if it is unclear whether it is forest or park then: either		
	on **tide swept rock** in exposed or moderately exposed situations with rich understorey of red and brown seaweeds and fauna of sponges, dead men's fingers and elegant anemones (*Sagartia elegans*)	IR.MIR.KR.LhypT	
	or on **tide swept boulders, cobbles, pebbles and gravel**	IR.MIR.KR.LhypTX	

	in exposed and moderately exposed situations with rich understorey of red and brown seaweeds and fauna of sponges, dead men's fingers and dahlia anemones (*Urticina felina*) or on **moderately exposed** coasts with **weak tidal currents**, bedrock and boulders with encrustations of **ross worm *(Sabellaria spinulosa)* tubes** and encrusting pink algae. Limited to sand-laden waters in NE England or on **exposed coasts** with **weak tidal currents**. Has less seaweeds and more anemones than biotopes above – includes jewel anemones (*Corynactis viridis*) and elegant anemones (*Sagartia elegans*)	IR.MIR.KR.Lhyp.Sab IR.HIR.KFaR.LhypFa	

A313 (A31)	***Golden kelp (Laminaria ochroleuca) communities*** Golden kelp occurs only in SW England and the Channel Islands. It is often mixed with cuvie and the follwing biotopes should only be used where it forms at least 50% of the kelp cover. Otherwise include in the cuvie biotopes ….go to **A312** either predominantly **golden kelp forest** or mixed cuvie and golden kelp in **exposed or very exposed** situations with foliose red seaweeds, encrusting pink algae and brown seaweeds or predominently **golden kelp forest** or mixed cuvie and golden kelp in **moderately exposed or sheltered** situations with **weak tidal streams**. Foliose red and brown seaweeds below with limited fauna	IR.HIR.KFaR.LhypR.Loch IR.LIR.K.LhypLoch

A314 (A31)	***Sugar kelp (Laminaria saccharina)*** winter scoured boulders and cobbles with sugar kelp and/or furbelows, limited fauna	IR.HIR.KSed.LsacSac

A315 (A31)	***Furbelows (Saccorhiza polyschides)*** winter scoured rocks, boulders and cobbles with furbelows *(Saccorhiza polyschides)* and other brown and red seaweeds, limited fauna or winter scoured boulders and cobbles with furbelows and/or sugar kelp, limited fauna	IR.HIR.KSed.Sac IR.HIR.KSed.LsacSac

A316 (A311)	***Laminaria digitata on moderately exposed (and sheltered) sublittoral fringe rock*** *L. digitata* forest with wide range of filamentous and foliose red seaweeds beneath or *L. digitata* forest on boulders or L. digitata forest on soft rocks with rock-boring animals and foliose red seaweeds	IR.MIR.KR.ldig IR.MIR.KR.ldig.Ldig IR.MIR.KR.ldig.Bo IR.MIR.KR.ldig.Pid

A317 (A312)	***exposed or moderately exposed Laminaria hyperborea kelp forest*** either kelp **forest** on **tide swept rock** in exposed or moderately	

	exposed situations with rich understorey of red and brown seaweeds and fauna of sponges, dead men's fingers and elegant anemones (*Sagartia elegans*)	IR.MIR.KR.LhypT.Ft
	or	
	kelp **forest** on **tide swept boulders, cobbles, pebbles and gravel** moderately exposed and sheltered situations with rich understorey of red and brown seaweeds and fauna of dahlia anemones (*Urticina felina*), barnacles keelworms and light bulb sea squirts (*Clavelina lepadiformis*)	IR.MIR.KR.LhypTX.Ft
	or	
	kelp **forest** on **bedrock and boulders** with **less tidal streams** than above. Dense foliose red seaweeds beneath the canopy with pink encrusting algae on rocks with encrusting sponges.	IR.MIR.KR.Lhyp.Ft
	or	
	kelp **forest** on **moderately exposed** coasts with **weak tidal currents**, bedrock and boulders with encrustations of **ross worm *(Sabellaria spinulosa)* tubes** and encrusting pink algae. Limited to sand-laden waters in NE England	IR.MIR.KR.Lhyp.Sab
	or	
	kelp **forest** on bedrock and boulders **extensively grazed** by urchins (*Echinus esculentus*)	IR.MIR.KR.Lhyp.GzFt
	or	
	kelp **forest** on bedrock and massive boulders in **exposed and wave surged** situations with high diversity of foliose red seaweeds, encrusting pink algae and a mixture of soft corals, anemones (including jewel and/or elegant anemones) and sponges	IR.HIR.KFaR.LhypFa
	or	
	kelp **forest** on bedrock of large boulders in **exposed** (or extremely exposed) situations with foliose red seaweeds and encrusting pink algae. Less animals than above	IR.HIR.KFaR.LhypR.Ft

A318 (A312)	***exposed or moderately exposed Laminaria hyperborea kelp park***	
	kelp **park** on **tide swept rock** in exposed or moderately exposed situations with rich understorey of red and brown seaweeds and fauna of sponges, dead men's fingers, hydroids (*Aglaophenia and Nemertesia*), sea squirts and bryozoans	IR.MIR.KR.LhypT.Pk
	or	
	kelp **park** on **tide swept boulders, cobbles, pebbles and gravel** in exposed and moderately exposed situations with rich understorey of red and brown seaweeds and fauna of sponges, dea mens fingers, anemones, hydroids, sea squirts and bryozoans	IR.MIR.KR.LhypTX.Pk
	or	
	kelp **park** on **bedrock and boulders** with **less tidal streams** than above. Dense foliose red seaweeds beneath the canopy with pink encrusting algae on rocks with encrusting sponges.	IR.MIR.KR.Lhyp.Pk
	or	
	kelp **park** on bedrock or large boulders in **exposed** (or extremely exposed) situations with foliose red seaweeds and encrusting pink algae. Generally less animals than above but cup-corals, dead men's fingers and featherstars often present	IR.HIR.KFaR.LhypR.Pk

	or kelp **park** on bedrock and boulders **extensively grazed** by urchins (*Echinus esculentus*). Pink encrusting algae and keelworms on rock beneath or kelp on **vertical bedrock** in **exposed** situations with red foliose seaweeds and jewel anemones (*Corynactis viridis*), plumose anemones (*Metridium senile*) or elegant anemones (*Sagartia elegans*) there are 5 sub-biotopes see JNCC site if you think you can go that far	IR.MIR.KR.Lhyp.GzPk IR.HIR.KFaR.LhypVt

A32 (A3)	***Dense foliose red seaweeds*** either moderately exposed bedrock and boulders in areas of **turbid water** with dense red seaweeds and without kelp. Common in the eastern English Channel or moderately exposed bedrock and boulders with dense red seaweeds usually **at or below kelp park** with pink encrusting algae beneath or moderately exposed bedrock and boulders with dense foliose red seaweeds **mixed with brown seaweeds**, *Dictyota dichotoma* and/or *Dictyopteris membranacea.*	 IR.MIR.KR.XFoR IR.HIR.KFaR.FoR IR.HIR.KFaR.FoR.Dic

A4 (A1)	***Moderate energy infralittoral rock*** ***Low energy infralittoral rock*** Biotopes for sheltered sites can fall in either the Moderate or Low energy classifications which makes them particularly difficult to determine. either was the site exposed to **strong tidal streams** if not either was the site **kelp** forest or kelp park (all kelp species) or was the main cover of foliose or filamentous **red seaweeds** or was the main cover of **japweed** *Sargassum muticum* or was the habitat vertical limestone/chalk with abundant boring red nose (*Hiatella arctica*) and sponges and some red and brown seaweeds	IR.MIR ***or*** IR.LIR IR.MIR.KT IR.MIR.KR.HiaSw	 go to A41 go to A42 go to A43 go to A44

A41 (A4)	***Kelp and seaweed communities in tide-swept sheltered conditions*** these conditions are typically found in narrows and sills of sea lochs and in estuaries either dense **oarweed** (*Laminaria digitata*) on shallow bedrock, boulders and cobbles with coralline crusts and sponges such as brewadcrumb sponge (*Halichondria panicea*) or **mixed cuvie and sugar kelp** (*Laminaria hyperborea* & *L.saccharina*) on scoured coralline-encrusted **rock** or **mixed cuvie and sugar kelp** (*Laminaria hyperborea* &	IR.MIR.KT IR.MIR.KT.LdigT IR.MIR.KT.XKT IR.MIR.KT.XKTX

	L.saccharina) with red seaweeds on **boulders, cobbles, pebbles and gravel** in tidal rapids or **sugar kelp** (*Laminaria saccharina*) on bedrock, boulders and cobbles in estuarine conditions with variable salinity and turbidity. Dense turf of red seaweeds (typically SW Britain) or **filamentous red seaweeds**, sponges and barnacles cobbles in extremely sheltered estuarine conditions with variable salinity and turbidity. (typically SW Britain)	 IR.MIR.KT.LsacT IR.MIR.KT.FilRVS

A42 (A4)	***Kelp communities on sheltered rock*** what was the main kelp species? Oarweed (*Laminaria digitata*) Cuvie or forest kelp *(Laminaria hyperborea*) Golden kelp (*Laminaria ochroleuca*) SW only Sugar kelp (*Laminaria saccharina*) Furbelows (*Saccorhiza polyschides*)	 …….go up to 311 ……..go to A421 ……..go to A422 ……..go to A423 …….go up to A315

A421 (A42)	**Cuvie or forest kelp *(Laminaria hyperborea*) communities in sheltered conditions** was the density of kelp: **Kelp forest** or **Kelp park**	 …….go to A424 …….go to A425

A422 (A42)	**Golden kelp (*Laminaria ochroleuca*) communities in sheltered conditions** Mixed cuvie (*Laminaria hyperborea*) and golden kelp (*L. ochroleuca*) or predominantly golden kelp **forest** in moderately exposed or sheltered situations with **weak tidal streams**. Foliose red and brown seaweeds below with limited fauna (SW England)	 IR.LIR.K.LhypLoch

A423 (A42)	**Sugar kelp (*Laminaria saccharina*) communities in sheltered conditions** either **Mixed cuvie** (*Laminaria hyperborea*) **and sugar kelp** (*L. saccharina*) on bedrock and boulders in sheltered situations There are three sub-biotopes - go to **A511** or Sugar kelp (Laminaria saccharina) on **very silty**, sheltered rock with few associated seaweeds and limited fauna	 IR.LIR.K.LhypLsac IR.LIR.K.Lsac

A424 (A421)	***sheltered Laminaria hyperborea kelp forest*** either kelp **forest** on **tide swept boulders, cobbles, pebbles and gravel** moderately exposed and sheltered situations with rich understorey of red and brown seaweeds and fauna of dahlia anemones (*Urticina felina*), barnacles keelworms and light bulb sea squirts (*Clavelina lepadiformis*)	 IR.MIR.KR.LhypTX.Ft

	or **Mixed cuvie** (*Laminaria hyperborea*) **and golden kelp** (*L. ochroleuca*) or predominantly golden kelp **forest** in moderately exposed or sheltered situations with **weak tidal streams**. Foliose red and brown seaweeds below with limited fauna or **Mixed cuvie** (*Laminaria hyperborea*) **and sugar kelp** (*L. saccharina*) on bedrock and boulders in sheltered situations There are three sub-biotopes - go to **A511**	IR.LIR.K.LhypLoch IR.LIR.K.LhypLsac

A425 (A421)	***sheltered Laminaria hyperborea kelp park*** either **Mixed cuvie** (*Laminaria hyperborea*) **and sugar kelp** (*L. saccharina*) **park,** in sheltered, often silted habitats. Kelp often with cape-form fronds. Foliose and encrusting algae beneath. or Mixed cuvie (*Laminaria hyperborea*) and sugar kelp (*L. saccharina*) on bedrock and boulders in sheltered situations There are three sub-biotopes - go to **A511**	IR.LIR.K.LhypLsac.Pk IR.LIR.K.LhypLsac

A43 (A4)	***there are no biotopes for foliose or filamentous red seaweed communities in sheltered conditions*** If you have reached this point consider either moderately exposed red seaweed communities or tide-swept kelp and seaweed communities in sheltered conditions	…….go up to A**32** …….go up to **A41**

A44 (A4)	***Japweed*** *Sargassum muticum* on shallow boulders, cobbles or pebbles in sheltered to extremely sheltered locations with moderately strong tidal streams. May also have sugar kelp (*Laminaria saccharina*) present	IR.LIR.K.Sar

A5 (A1)	***Low energy infralittoral rock*** either wave and tide sheltered rock with silted **kelp** communities, may be urchin grazed or very wave sheltered bedrock in areas of **variable/reduced salinity** such as the upper parts of sea lochs. Sugar kelp (*L. saccharina*) and pink encrusting algae or *Codium* are charactreristic. May be grazed by urchins and whelks or Kelp and seaweed communities in ***tide-swept*** sheltered conditions such as sills an narrows of sea lochs and estuaries or **Japweed** *Sargassum muticum* on shallow boulders, cobbles or pebbles in sheltered to extremely sheltered locations with moderately strong tidal streams. May also have sugar kelp (*Laminaria saccharina*) present or faunal dominated communities in areas of variable/reduced salinity, may include mussel beds or very shallow lagoons with low salinity, dominated by fucoids	IR.LIR IR.LIR.K IR.LIR.KVS IR.MIR.KT IR.LIR.K.Sar IR.LIR.IFaVS IR.LIR.Lag	 go to **A51** go to **A52** go back to **A41** go to **A53**

	and filamentous green seaweeds – unlikely to be covered in Seasearch dives – go to JNCC website for detail		

A51 (A5)	***Silted kelp communities***	IR.LIR.K
	Mixed cuvie (*Laminaria hyperborea*) and golden kelp (*L. ochroleuca*) or predominantly golden kelp **forest** in **moderately exposed or sheltered** situations with **weak tidal streams**. Foliose red and brown seaweeds below with limited fauna	IR.LIR.K.LhypLoch
	Mixed cuvie (*Laminaria hyperborea*) and sugar kelp (*L. saccharina*) on bedrock and boulders in sheltered situations There are three sub-biotopes - go to **A511**	IR.LIR.K.LhypLsac
	Sugar kelp (Laminaria saccharina) on very silty, sheltered rock with few associated seaweeds and limited fauna There are four sub-biotopes – go to **A512**	IR.LIR.K.Lsac
	Cape-form cuvie (*L. hyperborea*) on very silted and sheltered rock (often trailing onto the seabed) with silted foliose red seaweed understorey. Often many ascidians present	IR.LIR.K.LhypCape

A511 (A51)	***Mixed L.hyperborea and L.saccharina on sheltered infralittoral rock***	IR.LIR.K.LhypLsac
	either	
	Mixed cuvie (*Laminaria hyperborea*) and sugar kelp (*L. saccharina*) **forest,** in sheltered, often silted habitats. Kelp often with cape-form fronds. Limited fauna	IR.LIR.K.LhypLsac.Ft
	or	
	Mixed cuvie (*Laminaria hyperborea*) and sugar kelp (*L. saccharina*) **park,** in sheltered, often silted habitats. Kelp often with cape-form fronds. Foliose and encrusting algae beneath. More varied fauna than above	IR.LIR.K.LhypLsac.Pk
	or	
	Heavily **urchin grazed** silted rock with Mixed cuvie (*Laminaria hyperborea*) and sugar kelp (*L. saccharina*) **forest.** Limited algae on rocks due to grazing. Keelworms and bryozoan crusts common on verticals	IR.LIR.K.LhypLsac.Gz

A512 (A51)	***Laminaria saccharina on very sheltered infralittoral rock***	IR.LIR.K.Lsac
	either	
	very shallow, sheltered bedrock and boulders with mixed oarweed (Laminaria digitata) and sugar kelp (L. saccharina). Red algal understorey, pink encrusting algae and keelworms	IR.LIR.K.Lsac.Ldig
	or	
	shallow, very sheltered bedrock, boulders and cobbles with dense sugar kelp *(L.saccharina*) **forest**. Few other seaweeds, Sea squirts often prominent on verticals	IR.LIR.K.Lsac.Ft
	or	
	shallow, very sheltered bedrock or boulders with sugar kelp *(L.saccharina*) **park** (often the cape form). Few other seaweeds, Large solitary sea squirts often prominent	IR.LIR.K.Lsac.Pk
	or	
	very sheltered pink encrusted algae covered rock with urchins and brittlestars. Tufts of red seaweed and low abundance of sugar kelp *(L.saccharina*)	IR.LIR.K.Lsac.Gz

A52 (A5)	***Kelp in variable or reduced salinity***	IR.LIR.KVS
	either	
	very shallow, heavily silted rock with silt-tolerant green and red seaweeds. Dense *Codium* is characteristic and there is little *L.saccharina*. This biotope is restricted to lagoons and harbours	IR.LIR.KVS.Cod
	or	
	shallow bedrock and boulders characterised by *L. saccharina.* There are two biotopes	
	either	
	coralline-encrusting rock with keelworms grazed by *urchins Psammechinus miliaris* and *Echinus esculentus*	IR.LIR.KVS.LsacPsaVS
	or	
	with dense stands of filamentous green seaweeds which can form a blanket cover and/or red seaweeds *Phyllophora* and *Phycodrys*	IR.LIR.KVS.LsacPhyVS

A53 (A5)	***Faunal communities in variable or reduced salinity***	IR.LIR.IFaVS
	either	
	mussel beds in tide-swept entrance channels to the upper basins of sea lochs and similar habitats	IR.LIR.IFaVS.MytRS
	or	
	there are two other biotopes only described from one location, the upper Tamar Estuary. The characterising hydroids and bryozoans would be unlikely to be recorded by Seasearch surveyors	

A6 (A1)	***Features of infralittoral rock***	IR.FIR	
	either…..		
	gullies and shallow caves with rock,boulders,cobbles, pebbles or coarse sediment in gully floors and subject to strong wave surge	IR.FIR.SG	...go to **A61**
	or…..		
	wrecks/concrete pilings/cable debris or other artificial substrata with dense seaweed covering on both vertical and upper faces	IR.FIR.IFou	no more detail for this biotope

A61 (A6)	***Infralittoral surge gullies and caves***	IR.FIR.SG
	the following biotopes may well not be separated out on Seasearch forms. Use the part sample option to select multiple biotopes where appropriate	
	rock and boulders at wave surged **entrances** to gullies and caves with dense foliose red seaweeds in summer and pink encrusting algae all year. May be young kelp present in summer	IR.FIR.SG.FoSwCC
	wave surged **vertical** rock in surge gullies and caves with turf of sponges, soft corals and anemones. May be dense oaten pipes hydroid (*Tubularia indivisa*) and/or Crisiid turf	IR.FIR.SG.CrSpAsAn
	wave surged **vertical and overhanging** rock in gullies, tunnels and cave entrances with encrusting sponges and one or more of , gooseberry sea-squirts (*Dendrodoa grossularia),* elegant anemones (*Sagartia elegans*), dead men's fingers (*Alcyonium digitatum*) or barnacles. May be dense oaten pipes hydroid (*Tubularia indivisa*) growing though the sponges	IR.FIR.SG.CrSpAsDenB

	wave surged **vertical and overhanging** rock in gullies, tunnels and the **middle or back** of caves with dense sheets of gooseberry sea-squirts (*Dendrodoa grossularia*) and variable amounts of white lace sponge *(Clathrina coriacea),*	IR.FIR.SG. DenCcor
	walls or massive boulders in the **mid to back** of caves and gullies subject to severe wave surge with sponge crusts, barnacles and pink encrusting algae	IR.FIR.SG.CrSp
	Bare scoured rock or boulders in the **bottom** of wave-surged caves, tunnels or gullies. May be barnacles, keelworms, spirobid worms, or pink encrusting algae	IR.FIR.SG.CC
	There are two sub-biotopes…….	
	1. bedrock as described above	IR.FIR.SG.CC.BalPom
	2. mobile boulders with pink encrusting algae	IR.FIR.SG.CC.Mo

B CIRCALITTORAL ROCK HABITAT CODE: CR

Description:

Circalittoral rock is present all around the coast of Britain and Ireland and is characterised by animal dominated communities (as opposed to the algal dominated communities of the infralittoral zone). The circalittoral zone itself can be split into two sub-zones: the upper circalittoral (where foliose red algae are present) and the lower circalittoral (where foliose red algae are absent). The depth at which the circalittoral zone begins is directly dependent on the intensity of light reaching the seabed.

The character of circalittoral fauna varies enormously and is affected mainly by wave action, tidal stream strength, salinity, turbidity, the degree of scouring and rock topography. It is typical for the community *not* to be dominated by a single species (as is common in shore or infralittoral habitats), but rather comprise a mosaic of species. This, coupled with the range of influencing factors, makes circalittoral rock a difficult area to classify satisfactorily. *Particular care should therefore be taken in matching species and habitat data to the classification*.

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Box no.	KEY	CODE	Instruction
B1	Does the site contain dense mussel or brittlestar beds on rock or other hard surfaces or habitat not as above		..go to **B2** ..go to **B3**

B2 (B1)	Brittlestar beds on circalittoral rock or mussel beds on circalittoral rock		go to **B21** go to **B22**

B21 (B2)	***Brittlestar beds on circalittoral rock*** either Brittlestar bed overlying coralline crusts, encrusting bryozoans (*Parasmittina trispinosa)* and Devonshire cup-corals (*Caryophyllia smithii)* on wave-exposed circalittoral rock or Brittlestar bed on faunal and algal encrusted, exposed to moderately wave-exposed circalittoral rock or Dense brittlestars with sparse sea squirts (*Ascidia mentula* and *Ciona intestinalis)* on sheltered circalittoral bedrock, boulders and cobbles	CR.MCR.EcCr.CarSp.Bri CR.MCR.EcCr.FaAlCr.Bri CR.LCR.BrAs.AmenCio.Bri

B22 (B2)	***Mussel beds on circalittoral rock*** **Blue mussel *(Mytilus edulis)*** beds with hydroids and ascidians on tide-swept, exposed to moderately wave-exposed circalittoral rock **Mat mussel (*Musculus discors*)** beds with cushion and branching sponges on moderately tide-swept and exposed bedrock, boulders and cobbles	CR.MCR.CMus.CMyt CR.MCR.CMus.Mdis

B3 (B1)	Does the site comprise ***caves and overhangs or wrecks*** and other artificial hard substrata	CR.FCR.FouFa	go to **B9**
	or Is the rock **soft (chalk/limestone/clay**) and heavily bored by piddocks and worms (*Polydora*)	CR.MCR.Sfr	go to **B10**
	habitat not as above		go to **B4**

B4 (B3)	Site ***extremely exposed*** or ***very exposed***		…go to **B5**
	Site ***exposed*** or ***moderately exposed***		...go to **B6**
	Site ***sheltered***		...go to **B7**
	Site ***very sheltered*** or ***extremely sheltered***	CR.LCR	...go to **B8**

B5 (B4)	***extremely exposed*** or ***very exposed*** sites can fall within the high or moderate energy classifications based largely on the strength of the tidal streams	CR.HCR or CR.MCR	
	If the tidal streams are strong or very strong (greater than 3kts)		go to **B51**
	if the tidal streams are moderately strong or less (less than 3kts)		go to **B52**

B51 (B5)	***extremely exposed*** or ***very exposed*** sites with ***strong or very strong*** tidal streams		
	wave exposed, **tide swept** narrows and straits on bedrock and boulders. Typical species are oaten pipes hydroids (*Tubularia indivisa*), dead men's fingers (*Alcyonium digitatum*), elegant anemones (Sagartia elegans) and barnacles	CR.HCR.FaT	go to **B511**
	or **dahlia anemones and sand tolerant fauna** such as tapered chimney sponge (*Polymastia penicillus*) on **tide-swept bedrock and cobbles** adjacent to gravel and sand	CR.MCR.EcCr.UrtScr	
	or bedrock and boulders with strong to moderately strong tidal streams. A **diverse range of hydroids, bryozoans and sponges forming an often dense mixed animal turf**. This is a **very variable** complex with 9 biotopes identified and a further 6 sub-biotopes, though not all occur in extremely or very wave exposed situations	CR.HCR.XFa	go to **B522**
	or vertical, steep and upper faces of urchin grazed bedrock and boulders with common **dead men's fingers** (*Alcyonium digitatum*), pink encrusting algae and keelworms (note this biotope occurs in a range of tidal streams from strong to weak)	CR.MCR.FaAlCr.Adig	

B511 (B51)	***wave-exposed and tide-swept narrows and straits*** either	CR.HCR.FaT	
	upward facing, extremely tide swept circalittoral bedrock, boulders and cobbles found in a broad spectrum of wave exposures. Oaten pipe hydroids (*Tubularia indivisa*) and barnacles often dominant	CR.HCR.FaT.BalTub	

	or vertical and upper faces of strongly tide-swept and wave-exposed bedrock and boulders. Characterised by dense oaten pipes hydroids (*Tubularia indivisa*). There are two sub biotopes	CR.HCR.FaT.CTub	go to **B512**

B512 (B511)	***Oaten pipes hydroids (Tubularia indivisa) on tide-swept circalittoral rock*** either	CR.HCR.FaT.CTub
	Oaten pipes hydroids and cushion sponges in turbid areas or	CR.HCR.FaT.CTub.CuSp
	Dead men's fingers (*Alycyonium digitatum*) in areas of accelerated tidal streams (promontories, narrows) Common anemones include elegant anemones (*Sagartia elegans*), dahlia anemones (*Urticina felina*) and plumose anemones (*Metridium senile*)	CR.HCR.FaT.CTub.Adig

B52 (B5)	***extremely exposed*** or ***very exposed*** sites with ***moderately strong or less*** tidal streams		
	deep (30m+)wave exposed circalittoral bedrock with **negligible tidal streams** and a wide variety of sponges as well as soft corals, cup-corals, urchins and cotton spinners or	CR.HCR.DpSp	go to **B521**
	wave exposed bedrock and boulders with strong to moderately strong tidal streams. A **diverse range of hydroids, bryozoans and sponges forming an often dense mixed animal turf**. This is a **very variable** complex with 9 biotopes identified and a further 6 sub-biotopes, though not all occur in extremely or very wave exposed situations or	CR.HCR.XFa	go to **B522**
	faunal turf dominated by **echinoderms** – urchins, encrusting bryozoans **and encrusting pink algae** this is a medium energy biotope complex and not and not all of the biotopes within it apply to extremely or very exposed sites – proceed with care!	CR.MCR.EcCr	go to **B622**

B521 (B52)	***Deep circalittoral sponge communities*** this biotope complex is normally found below 30m depth and is most often recorded from the west coast of Ireland. Some of the sponges most commonly found are *Pachymatisma johnstonia, Polymastia boletiformis, Stelligera stuposa, Cliona celata, Axinella dissimilis and Axinella infundibuliformis*. Other sponge dominated communities are found in B53 – compare with these before coming to a decision.	CR.HCR.DpSp
	There is one biotope identified in which *Phakellia ventilabrum* and Axinellid sponges dominate (*Axinella dissimilis, Axinella infundibuliformis & Stelligera stuposa)*.	CR.HCR.DpSp.PhaAxi

B522 (B51) (B52)	***Mixed faunal turf communities on circalittoral bedrock and boulders in extremely or very wave exposed situations*** if none of the following fit and providing the site was very or extremely wave exposed stick with the biotope complex. Note there are additional biotopes for	CR.HCR.XFa	

	moderately exposed or exposed situations (see **B62**) either Was the habitat on **steep, vertical or overhanging bedrock** or was the **pink sea fan** (*Eunicella verrucosa*) a prominent species or was **hornwrack** (*Flustra foliacea*) a dominating species or was there a **mixed bryozoan/hydroid turf** with erect sponges	CR.HCR.XFa.ByErSp	go to **523** go to **524** go to **525** go to **526**

B523 (B522)	***steep/vertical circalittoral bedrock/boulders*** with either surfaces dominated by **jewel anemones** (*Corynactis viridis*) with cup-corals, a short bryozoan turf and a variety of sponges or surfaces dominated by a **mixed turf** of hydroids (*Nemertesia, Tubularia, Halecium*) and bryozoans (*Alcyonidium, Crisia*) with a range of sponges, dead men's fingers and cup-corals and anemones	CR.HCR.XFa.CvirCri CR.HCR.XFa.SpAnVt

B524 (B522)	***pink sea fans (Eunicella verrucosa)*** either **bedrock and boulders and rocky outcrops**, often surrounded by coarse sediment dominated by pink sea fans with potato crisp bryozoans (*Pentapora foliacea*), red fingers (*Alcyonium glomeratum*) and cup-corals (*Caryophyllia smithii),* Dead men's fingers, yellow cluster anemones, and *Nemertesia spp*. are often present or pink sea fans may occur on **steep and vertical surfaces**, normally in smaller numbers amongst a mixed hydroid/ bryozoan/sponge turf note that northern sea fans (*Swiftia pallida*) are not normally found in such exposed conditions go to **B614** to find them	CR.HCR.XFa.ByErSp.Eun CR.HCR.XFa.SpAnVt

B525 (B522)	***hornwrack (Flusta foliacea)*** either hornwrack and colonial ascidians on **bedrock and boulders** often subject to scour. May also include dead men's fingers, dahlia anemones (*Urticina felina*) and a variety of hydroids or hornwrack and hydroid turf on **boulders, cobbles and pebbles** often subject to scour note that there are a number of other sub biotopes characterised by hornwrack with occur in tide-swept moderately exposed situations. Go to **B611** to find them	CR.HCR.XFa.FluCoAs CR.HCR.XFa.FluCoAs.X

B526 (B522)	***mixed bryozoan/hydroid turf with erect sponges*** bedrock and boulders with moderately strong to strong tidal streams. Byrozoans include crisiids, *Alcyonidium, Flustra, Pentapora* and *Bugula* spp. Hydroids include *Nemertesia spp. & Halecium.* Characteristic erect sponges are *Raspailia ramosa, Stelligera stuposa* and *S.rigida* There are a number of sub biotopes:	CR.HCR.XFa.ByErSp

	as above with pink sea fans (Eunicella verrucosa)	CR.HCR.XFa.ByErSp.Eun	
	as above but with more sponges, especially *Dysidea fragilis, Pachymatisma johnstonia, Amphilectus fucorum, Hemimycale* and others. The white striped anemone *Actinothoe sphyrodeta* is often common. This biotope is recorded from the Irish Sea and Lundy.	CR.HCR.XFa.ByErSp.DysAct	
	as above with a dense sponge, hydroid and bryozoan turf and frequent dead men's fingers. Anemones are common including elegant anemones (*Sagarta elegans*), dahlia anemones (*Urticina felina*) and plumose anemones (*Metridium senile*)	CR.HCR.XFa.ByErSp.Sag	
B6 (B4)	***High energy circalittoral rock <u>or</u>***	CR.HCR *<u>or</u>*	
	Moderate engery circalittoral rock	CR.MCR	
	Biotopes for exposed and moderately exposed sites can fall in either the High or Moderate energy classifications which makes them particularly difficult to determine. Many sites covered by Seasearch surveys will fall in this category		
	was the site:		
	wave exposed, **tide swept** narrow and strait on bedrock and boulders. Typical species are oaten pipes hydroids (*Tubularia indivisa*), dead men's fingers (*Alcyonium digitatum*), elegant anemones (Sagartia elegans) and barnacles	CR.HCR.FaT	….go up to **B511**
	or		
	deep (30m+)wave exposed circalittoral bedrock with **negligible tidal streams** and a wide variety of sponges as well as soft corals, cup-corals, urchins and cotton spinners	CR.HCR.DpSp	…go up to **B521**
	or		
	not as above but with a **mixed faunal turf**		…go to **B61**
B61 (B6)	***Circalittoral mixed faunal communities on exposed and moderately exposed bedrock, boulders and cobbles (1)***		
	either		
	were **hornwracks *Flustra foliacea* and/or *Securiflustra securifrons*** prominent features in the faunal turf?		..go to **B611**
	or		
	were the rocks covered with **ross worm (*Sabellaria spinulosa*)** tubes?		..go to **B612**
	or		
	were **pink sea fans** (***Eunicella verrucosa***) **or Northern sea fans** (***Swiftia pallida***) a significant part of the faunal turf		..go to **B613**
	or		
	none of the above		..go to **B62**
611 (61)	***Hornwracks (Flustra foliacea and Securiflustra securifrons) communities***		
	these occur in more than one biotope complex so you need to go to the biotope – the options are:		
	hornwrack (*Flustra foliacea*) and colonial ascidians on **bedrock and boulders** often subject to scour. May also	CR.HCR.XFa.FluCoAs	

	include dead men's fingers, dahlia anemones (*Urticina felina*) and a variety of hydroids or **hornwrack (*Flustra foliacea*) and hydroid turf** on **boulders, cobbles and pebbles** often subject to scour or **hornwrack (*Flustra foliacea*) and colonial sea squirts *Polyclinum aurantium*** on moderately tide-swept bedrock and boulders with sand scour. Usually in poor visibility areas or **hornwrack (*Flustra foliacea*) and small solitary and colonial sea squirts** (incl. *Polycarpa, Dendrodoa, Molgula, Botryllus and Clasvelina*) with bryozoan and hydroid turf or **hornwrack (*Flustra foliacea*) and *Haliclona oculata*** on silted cobbles and pebbles in tide-swept conditions or **hornwrack (*Flustra foliacea*)** on urchin grazed surfaces with gravely sand patches containing dahlia anemones (*Urticina felina*). Relatively sparse faunal turf. or **square-end hornwrack (*Securiflustra securifrons*) with abundant dead men's fingers (*Alcyonium digitatum*)** on upper and vertical bedrock faces. Grazed rock surfaces with pink encrusting algae	 CR.HCR.XFa.FluCoAs.X CR.HCR.XFa.FluCoAs.Paur CR.HCR.XFa.FluCoAs.SmAs CR.HCR.XFa.FluHocu CR.MCR.EcCr.FaAlCr.Flu CR.MCR.EcCr.FaAlCr.Sec

B612 (B61)	**ross worm *(Sabellaria spinulosa*) communities on circalittoral rock** there are two biotopes identified: either ***Sabellaria* with a bryozoan turf and barnacles** on silty, turbid circalittoral bedrock, boulders and cobbles subject to strong or moderately strong tidal streams or ***Sabellaria*** with didemnids and other small ascidians on tide-swept bedrock, boulders and cobbles	CR.MCR.CSab CR.MCR.CSab.Sspi.ByB CR.MCR.CSab.Sspi.As

B613 (B61)	***Sea fan communities*** was the sea fan species present either Pink sea fan (*Eunicella verrucosa*) or Northern sea fan (*Swiftia pallida*)		 ..go up to **B524** …...go to **B614**

B614 (B61)	***Northern sea fan (Swiftia pallida) communities*** either **mixed turf of hydroids and large sea squirts with *Swiftia pallida*** on exposed to sheltered bedrock and boulders with moderately strong to weak tidal streams. This is the most species-rich of the *Swiftia* biotopes or cup-corals (*Caryophyllia smithii*), *Swiftia* and large sea squirts on exposed to moderately exposed bedrock and boulders with mainly weak tidal streams and some silt. It lacks the diverse range of sponges, hydroids and bryozoans in the biotope above	 CR.HCR.XFa.SwiLgAs CR.MCR.EcCr.CarSwi.LgAs

	or cup-corals (*Caryophyllia smithii*), *Swiftia* and red fingers (*Alcyonium glomeratum*) onwave-sheltered bedrock and boulders with weak tidal streams. Normally heavily silted	CR.MCR.EcCr.CarSwi.Aglo	
B62 (B6)	***Circalittoral mixed faunal communities on exposed and moderately exposed bedrock, boulders and cobbles (2)*** either dense mixed faunal turf with a **diverse range of hydroids, btyozoans and sponges** or faunal turf dominated by **echinoderms** – urchins, encrusting bryozoans **and encrusting pink algae**	CR.HCR.XFa CR.MCR.Ec Cr	..go to **B621** ..go to **B622**

B621 (B62)	***dense mixed faunal turf with a diverse range of hydroids, bryozoans and sponges*** this biotope complex is very widespread and occurs on wave-exposed circalittoral bedrock and boulders in strong or moderately strong tidal streams. It is characterised by a diverse range of hydroids (incl. *Halecium* and the antenna hydroids, *Nemertesia spp*.), bryozoans such as *Alcyonidium diaphanum, Flustra foliacea* and *Bugula* spp. and sponges (incl boring, purse, carrot, crater, chocolate finger and goosebump sponges). There are nine biotopes within the complex, three of which have been covered earlier in this key. Those remaining are:	CR.HCR.XFa
	mixed bryozoan/hydroid turf with erect sponges bedrock and boulders with moderately strong to strong tidal streams. Byrozoans include crisiids, *Alcyonidium, Flustra, Pentapora* and *Bugula* spp. Hydroids include *Nemertesia spp. & Halecium.* Characteristic erect sponges are *Raspailia ramosa, Stelligera stuposa* and *S.rigida* there are three sub-biotopes …….go to B**526** to see them	CR.HCR.XFa.ByErSp
	steep/vertical surfaces dominated by **jewel anemones** (*Corynactis viridis*) with cup-corals, a short bryozoan turf and a variety of sponges	CR.HCR.XFa.CvirCri
	sparse sponges, antenna **hydroids** (*Nemertesia spp*.) and **finger bryozoans** (*Alcyonidium diaphanum*) on **boulders cobbles and pebbles**	CR.HCR.XFa.SpNemAdia
	heavily silted normally limestone bedrock and boulders with large ***Suberites spp* sponges**, dense bryozoan turf (*Crisia* spp.) and *Polydora* worms tubes and red nose *Hiatella arctica* may also be present. Currently only recorded from the east coast of Anglesey	CR.HCR.XFa.SubCriTf
	shallow sublittoral, **turbid water, bedrock and cobbles** with patches of sand causing scour. **Dense** aggregations of the silty sea squirt ***Molgula manhattensis***	CR.HCR.XFa.Mol
	steep/vertical surfaces dominated by a **mixed turf** of hydroids (*Nemertesia, Tubularia, Halecium*) and bryozoans (*Alcyonidium, Crisia*) with a range of sponges, dead men's fingers and cup-corals and anemones	CR.HCR.XFa.SpAnVt

B622 (B62)	***echinoderms and crustose communities*** faunal turf dominated by **echinoderms** – urchins, encrusting bryozoans **and encrusting pink algae** there are five biotopes within this complex, one of which has been covered earlier in this key. Those remaining are:	CR.MCR.EcCr	
	cup-corals (*Caryophyllia smithii*), **dead men's fingers** (*Alcyonium digitatum*), **large sponges** (boring and elephant hide) and occasional urchins on often silty bedrock and boulders in the **20-30m** depth range. there are two sub-biotopes:	CR.MCR.EcCr.CarSp	go to **B623**
	dahlia anemones and sand tolerant fauna such as tapered chimney sponge (*Polymastia penicillus*) on tide-swept bedrock and cobbles adjacent to gravel and sand	CR.MCR.EcCr.UrtScr	
	encrusting bryozoans and algae on **grazed** bedrock, boulders and cobbles with frequent urchins and dead men's fingers (*Alcyonium digitatum*) there are six sub-biotopes, three of which have been covered earlier	CR.MCR.EcCr.FaAlCr	go to **B624**
	encrusting bryozoans and algae and keelworms on **grazed vertical and overhanging bedrock**, dense dead men's fingers (*Alcyonium digitatum*) and cup-corals (*Caryophyllia smithii*) may also be present	CR.MCR.EcCr.AdigVt	

B623 (B622)	**cup-corals** (*Caryophyllia smithii*), **dead men's fingers** (*Alcyonium digitatum*), **large sponges** (boring and elephant hide) and occasional urchins on often silty bedrock and boulders in the **20-30m** depth range the two sub-biotopes are:	CR.MCR.EcCr.CarSp
	dense brittlestars overlying pink encrusting algae covered bedrock and boulders	CR.MCR.EcCr.CarSp.Bri
	open coasts or offshore bedrock and boulders, urchin grazed but with a wide range of sponges, hydroids, bryozoans and echinoderms in relatively low densities. potato crisp and staghorn bryozoans (*Pentapora foliacea & Porella compressa*) often present. Most records from west coast of Ireland	CR.MCR.EcCr.CarSp.PenPcom

B624 (B622)	**encrusting bryozoans and algae** on **grazed** bedrock, boulders and cobbles with frequent urchins and dead men's fingers (*Alcyonium digitatum*) the three remaining sub-biotopes are:	CR.MCR.EcCr.FaAlCr
	vertical, steep and upper faces of urchin grazed bedrock and boulders with common **dead men's fingers** (Alcyonium digitatum), pink encrusting algae and keelworms	CR.MCR.EcCr.FaAlCr.Adig
	upper faces of urchin grazed bedrock, boulders and cobbles with **pink encrusting algae and keelworms** and lesser numbers of dead men's fingers than above	CR.MCR.EcCr.FaAlCr.Pom

	vertical, steep and upper faces of urchin grazed bedrock and boulders in areas with little tidal streams similar to above but with **cup corals (*Caryophyllia smithii*)**	CR.MCR.EcCr.FaAlCr.Car	

B7 (B4)	***Moderate energy circalittoral rock***	CR.MCR ***or***	
	Low energy circalittoral rock	CR.LCR	
	Biotopes for sheltered sites can fall in either the Moderate or Low energy classifications (or in one case High energy) is the habitat:		
	either		
	in an area of **variable salinity** such as estuaries, rias etc	CR.MCR.CFaVS	go to **B83**
	or		
	bedrock and boulders in very **wave sheltered areas with weak tidal streams**. Often dominated by encrusting red algae, brachipods and/or sea squirts. (Note that **B81** includes biotopes only found in very or extremely sheltered locations as well as those in sheltered locations)	CR.LCR.BrAs	go to **B81**
	or		
	characterised by the presence of **northern sea fans** (*Swiftia pallida*) **and cup-corals** (*Caryophyllia smithii*)		go up to **B614**
	or		
	vertical, steep and upper faces of **urchin grazed bedrock** and boulders in areas with little tidal streams **with dead mens fingers** (*Alcyonium digitatum*) and **cup corals** (*Caryophyllia smithii*)	CR.MCR.EcCr. FaAlCr.Car	
	or		
	dahlia anemones and sand tolerant fauna such as tapered chimney sponge (*Polymastia penicillus*) on **tide-swept bedrock and cobbles** adjacent to gravel and sand	CR.MCR.EcCr. UrtScr	

B8 (B4)	***very sheltered or extremely sheltered circalittoral rock***		
	was the site either	CR.LCR	go to **B81**
	subject to weak or very **weak tidal streams**		
	or	CR.HCR.FaT.Bal Tub	go to **B82**
	subject to strong to very **strong tidal steams**		
	or		
	in an area of **variable/reduced salinity**	CR.MCR.CFaVS	go to **B83**

B81 (B8)	***low energy circalittoral rock***	CR.LCR	
	bedrock and boulders in very wave sheltered areas with weak tidal streams. Often dominated by encrusting red algae, brachipods and/or sea squirts.		
	There is one biotope complex which is typically found in Scottish sealochs characterised by brachipods and sea squirts such as the yellow rimmed sea squirt (*Ciona intestinalis*), the red sea squirt (*Ascidia mentula*), pink edged sea squirt (*Ascidia virginea*) and gas mantle sea squirt (*Corella parallelogramma*)	CR.LCR.BrAs	
	Within this biotope complex there are four biotopes distinguished by species composition:		go to **B811**

B811 (B81)	***brachiopod and ascidian communities***	CR.LCR.BrAs
	either	
	rather barren upward facing bedrock boulders and cobbles with pink encrusting algae and grazed by	CR.LCR.BrAsAmenCio

	urchins. Solitary sea squirts - yellow rimmed sea squirt (*Ciona intestinalis*), the red sea squirt (*Ascidia mentula*) are present as well as common starfish and brittlestars, There are two sub-biotopes depending on how many brittlestars are present: or bedock and boulders in sheltered channels with varying amounts of tidal flow. Steep sides with **erect sponges and large solitary sea squirts**. Currently only identified in west of Ireland or sheltered silty bedrock and boulder slopes in sea lochs with weak tidal streams but **not grazed** and barren but with a range of different species including keelworms, brachipods, featherstars, and sea squirts or sheltered bedrock and boulder slopes in sea lochs with weak tidal streams characterised by dense sealoch anemones (*Protanthea simplex*) and peacock worms (*Sabella pavonnina*).. Brachipods and saddle oysters usually present. There are two sub-biotopes depending on how fully saline it is	……..go to **B812** CR.LCR.BrAs.LgAsSp CR.LCR.BrAs.AntAsH CR.LCR.BrAs.NeoPro …….go to **B813**

B812 (B811)	***solitary ascidians and brittlestars*** either often on vertical or steeply sloping rock. Large sea squirts yellow rimmed sea squirt (*Ciona intestinalis*), the red sea squirt (*Ascidia mentula*) are common together with cup-corals, urchins and low densities of common brittlestar (*Ophiothrix fragilis*) or upward facing bedrock, boulders and cobbles with less sea squirts and dense carpet of brittlestars – especially common brittlestar (*Ophiothrix fragilis*) and black brittlestar (*Ophiocomina nigra*)	 CR.LCR.BrAsAmenCio.Ant CR.LCR.BrAsAmenCio.Bri

B813 (B811)	***Brachipods and sea loch anemones on very wave sheltered circalittoral rock*** either **fully saline** with common sea loch anemones or areas with **variable salinity** where **dense gooseberry sea squirts** *(Dendrodoa grossularia)* and brachipods are common and sea loch anemones are only occasional	CR.LCR.BrAs.NeoPro CR.LCR.BrAs.NeoPro.FS CR.LCR.BrAs.NeoPro.VS

B82 (B8)	***Barnacles and oaten pipe hydroids on extremely tide-swept circalittoral rock*** This biotope occurs on bedrock, boulders and cobbles in a wide range of exposures from extremely exposed to extremely sheltered but always where there are strong or very strong tidal streams. It is characterised by a few species capable of hanging on in such conditions such as barnacles (*Balanus crenatus*), oaten pipe hydroids (*Tubularia indivisa*), breadcrumb sponge (*Halichondria panicea*) and current tolerant anemones such as elegant anemones (*Sagartia elegans*), dahlia anemone (*Urticina felina*) and plumose anemone (*Metridium senile*)	CR.HCR.FaT.BalTub

83 (8)	***Faunal communities in variable salinity*** found in bedrock and cobbles in sheltered areas with reduced salinity such as rias, There are two biotopes and	CR.MCR.CFaVS

	two sub-biotopes within this complex: either bedrock and boulders with cushion sponges and hydroids in turbid situations with moderately strong tidal streams. The sponges include *Hymeniacidon perleve*, breadcrumb sponge (*Halichondria panicea*), *Halichondria bowerbanki* and boring sponge (*Cliona celata*). There are two closely-related sub-biotopes: or the other biotope is only recorded from one brackish Scottish sea loch (Loch Etive) and is based on species not likely to be recorded by Seasearch recorders.	CR.MCR.CFaVS.CuSpH ……..go to **B831** CR.MCR.CFaVS.HbowEud

B831 (B83)	***cushion sponges, hydroids and ascidians*** either a wide range of sponges, hydroids and ascidians, typically in relatively shallow water (5-11m) apart from the sponges listed in 83 the tasselled form of the carrot sponge (*Amphilectus fucorum*) may be frequent , the hydroids include antenna hydroids (*Nemertesia spp*.), *Plumularia*, *Hydrallmania* and *Halecium*. or in less saline conditions with a much less diverse range of sponges, hydroids and sea squirts	CR.MCR.CFaVS.CuSpH CR.MCR.CFaVS.CuSpH.As CR.MCR.CFaVS.CuSpH.VS

B9 (B3)	***Features of circalittoral rock*** either….. gullies and caves in the circalittoral zone away from strong wave action or….. wrecks/concerete pilings/cable/fishing debris or other artificial substrata in the circalittoral zone	CR.FCR CR.FCR.Cv CR.FCR.FouFa	 go to **B91** go to **B92**

B91 (B9)	***Circalittoral caves and overhangs*** either stick with the biotope complex or look at shaded and overhanging rock surfaces below the surge zone (for caves in the surge zone see Infralittoral Rock – FIR.SG). Fauna may contain sponges (incl black tar and/or mashed potato sponge (*Dercitus bucklandi* & *Thymosia guernei*), cup corals (*Leptopsammia pruvoti, Hoplangia durotrix* and/or *Caryophyllia inornata*) pink sea fingers (*Alcyonium hibernicum*), and cluster anemones (*Parazoanthus* spp.)	 CR.FCR.Cv CR.FCR.Cv.SpCup

B92 (B9)	***circalittoral fouling communities*** the biotope complex includes two very specific biotopes and omits others. If neither biotope below fits use the biotope complex either **steel wrecks** typically covered by dead men's fingers (*Alcyoniun digitatum*), plumose anemones (*Metridium senile*) and white striped anemones (*Actinothoe sphyrodeta*) Note that dense sea fan forests typical of many deeper wrecks in SW England are not covered here or anywhere else or sheltered artificial substrata such as **discarded fishing nets or scrap metal on muddy sediment plains** often with high numbers of the sea squirt *Ascidiella aspersa*.	CR.FCR.FouFa CR.FCR.FouFa.AdigMetsen CR.FCR.FouFa.Aasp

B10 (B3)	***Soft rock communities*** moderately wave-exposed soft bedrock subject to moderately strong tidal streams. Circalittoral zone may be very shallow due to turbidity. Bored by piddocks, other boring bivalves and *Polydora* worms. There are three biotopes within this complex: either **soft chalk or clay with abundant piddocks** (usually *Pholas dactylus*), and limited fauna, especially on upward-facing surfaces or **vertical and overhanging soft rock** (usually chalk) bored by the red-nose (*Hiatella arctica*) with a wider range of sessile fauna than above (note there is a similar infralittoral biotopes if there are also seaweeds present – IR.MIR.KR.HiaSw or soft rock covered by ***Polydora* worm tubes**	CR.MCR.SfR CR.MCR.SfR.Pid CR.MCR.SfR.Hia CR.MCR.SfR.Pol

C SUBLITTORAL SEDIMENT HABITAT CODE: SS

Description:
This section covers sediment habitats in the sublittoral near-shore zone (covering both infralittoral and circalittoral zones), typically extending from the extreme lower shore down to 200 m or so. Sediment ranges from boulders and cobbles, through pebbles and gravel, to coarse sands, fine sands, muds and mixed sediments. Note that boulders and cobbles also appear in the Infralittoral and Circalittoral Rock sections – only include habitats with bolders in this section if there are are relatively small proportion of the overall sediment habitat.

There are 30 biotope complexes, 103 biotopes and a further 9 sub-biotopes associated with this broad habitat category, but many have been omitted because they concern habitats rarely visited by Seasearch divers (e.g. lagoons or offshore sediments typically deeper than 40m) or are based on infaunal species unlikely to be recorded by Seasearch surveys .

There are a number of very distinct biotopes based on animal and algal turfs/beds on sediment and these are dealt with first. The next sub-divisions ('main habitats') are based upon *the type of sediment and/or sediment mix* that is entered in the habitat description of your Survey Form. Unlike the previous two broad habitats (the Infralittoral and Circalittoral), divisions here are not primarily based upon the energy regime affecting the community. Instead, *sediment type* is given greater priority, followed by depth. Trying to decide which type of sediment you have may not be as straight-forward as it sounds, so be prepared for some careful searching. For instance, do you have muddy sand (where sand predominates but is mixed with mud); or do you have sandy mud (where mud predominates but is mixed with sand)?

Box no.	KEY	CODE	Instruction
C1	Does the site contain dense **animal beds** (brittlestars, oysters, flame shells, peacock worms, slipper limpets, mussels, tubeworms or sea cucumbers) living on or in sedimentsmussel or brittlestar beds on rock or other hard surfaces		..go to **C2**
	or		
	Does the site contain significant amounts of **seaweeds, maerl or seagrass**		..go to **C3**
	or		
	neither of the above		..go to **C4**

C2 (C1)	***Animal beds on sediments*** Is the animal bed dominated by:		
	brittlestars (*Ophiothrix fragilis* or *Ophiocomina nigra*)	SS.SMX.CMx.OphMx	
	flame shells (*Limaria hinans*)	SS.SMx.IMx.Lim	
	sea cucumbers *(Neopentadactyla mixta or Ocnus planci)*		go to **C21**
	mussels (*Mytilus edulis* or *Modiolus modiolus*)		go to **C22**
	oysters *(Ostrea edulis*)	SS.SMxIMx.Ost	

	peacock worms (*Sabella pavonina*)	SS.SMxIMxSpav SpAn	
	sea pens (all species)		go to **C23**
	slipper limpets (*Crepidula fornicata*)		go to **C24**
	tube worms (*Sabellaria spp.* or *Serpula vermicularis*)		go to **C25**

C21 (C2)	***Sea cucumber beds in sediments***	
	either	
	dense gravel sea cucumbers (*Neopentadactyla mixta)* in clean gravels, maerl and sand	SS.SCS.CCS.Nmix
	or	
	dense beds of *Ocnus planci* in sheltered conditions such as sea lochs	SS.SMu.IFMu.Ocn

C22 (C2)	***Mussel beds on sediments***	SS.SBR.SMus
	Note that small numbers of mussels may appear in other biotopes use this only for dense mussel beds	
	either	
	Blue mussel *(Mytilus edulis)* beds in shallow mixed sediment often with common starfish, whelks and dahlia anemones	SS.SBR.SMus.MytSS
	or	
	Horse mussel (*Modiolus modiolus*) beds there are four biotopes for horse mussel beds	…….go to **C221**

C221 (C22)	**Horse mussel (*Modiolus modiolus*)** beds	
	either	
	in **tide-swept** conditions on the open coast with common starfish, brittlestars, dead men's fingers or in channels (there is a separate biotope for deep offhsore *Modiolus* beds which will be below the depth of Seasearch records)	SS.SBR.SMus.ModT
	or	
	dense beds in **slightly tide-swept but sheltered** locations with variegated scallop (*Chlamys varia*) hydroids, sea squirts, brittlestars and featherstars	SS.SBR.SMus.ModCvar
	or	
	beds or scattered clumps in **sheltered conditions with little tide.** Much less species rich than the above	SS.SBR.SMus.ModHAs
	or	
	sparse *Modiolus* with many burrowing anemones (*Cerianthus lloydii*) **and cucumbers** (*Psolus, Paracucumaria, Thyonidium, Thyone & Leptopentacta*) in sheltered sea lochs with little tide.	SS.SMx.CMx.ClloModHo

C23 (C2)	**Sea pens (all species) in sublittoral sediment**	
	either	
	slender sea pens (*Virgularia mirabilis*) in **fine sandy mud** with sand brittlestars (*Ophiura* spp.) and king scallops. A widespread biotope in sealochs	SS.SMu.CSaMu.VirOphPmax
	or	
	as above but on **gravelly/shelly mud or sandy mud with stones.** A wider range of attached life (hydroids, sea squirts) due to the stones	SS.SMu.CSaMu.VirOphPmax.HAs

	or mud plains in sea lochs below 15m with **burrows and mounds and slender and phosphorescent sea pens** *(Virgularia mirabilis & Pennatula phosphorea).* Burrowing animals include scampi (*Nephrops norvegicus*), burrowing anemones (*Cerianthus lloydii*) and fireworks anemone (*Pachycerianthus multiplicatus*) or as above but with the addition of **tall sea pens** (*Funiculina quadrangularis*)	SS.SMu.CFiMu.SpnMeg SS.SMu.CFiMu.SpnMeg.Fun

C24 (C2)	***Slipper limpet (Crepidula fornicata) beds*** Slipper limpet beds fall within two biotopes either slipper limpets on mixed sediment in **very sheltered sites** with **variable salinity** or (and this is more likely to be encountered on Seasearch surveys) slipper limpets **on coarse sands, gravel, shells, pebbles and cobbles** on **moderately exposed coasts** with ascidians and anemones	 SS.SMx.SMxVS.CreMed SS.SMx.IMx.CreAsAn

C25 (C2)	**Tube worms forming reefs on sublittoral sediment** sublittoral reefs of polychaete worms on mixed sediments in a range of exposures and tidal streams. There are three biotopes in this complex each based on a different species: either **Ross worm** (*Sabellaria spinulosa*) or **Honeycomb worm** (*Sabellaria alveolata*) restricted to very shallow sites with variable salinity and more often found intertidally or **Organ pipe worm** (*Serpula vermicularis*) restricted to very sheltered shallow inlets in SW Scotland and W Ireland	SS.SBR.PoR SS.SBR.PoR.SspiMx SS.SBR.PoR.SalvMx SS.SBR.PoR.Ser

C3 (C1)	***seaweeds, maerl and seagrass on sediments*** either shallow sublittoral sediments with **seaweed communities, particularly sugar kelp** (Laminaria saccharina) **and mermaid's tresses** (Chorda filum) and various red and brown, usually filamentous seaweeds or **maerl beds** There are 4 biotopes and 2 sub-biotopes within this complex based on species composition. This is likely to be beyond the scope of most Seasearch surveys or **seagrass beds** - eelgrass (*Zostera marina*) There is also a biotope based on the brackish water seagrass *Ruppia maritima* and a complex for lagoonal flowering plants. Neither of these are likely to be covered in Seasearch surveys	SS.SMp SS.SMp.KSwSS SS.SMp.Mrl SS.SMp.SSgr.Zmar	go to **C31**

C31 (C3)	***Kelp and seaweed communities on sublittoral sediment*** was the seaweed community either:	SS.SMp.KSwSS
	mainly **sugar kelp** (*Laminaria saccharina*) often with other **red and brown seaweeds**	……go to **C311**
	or	
	dense filamentous green seaweeds (esp. Enteromorpha) in areas of variable salinity	SS.SMp.KSwSS.FilG
	or	
	loose lying seaweed mats in very sheltered conditions	
	There are two biotopes but they are based on seaweeds unlikely to be recorded in Seasearch surveys – best to stick with the complex	

C311 (C31)	***Sugar kelp (Laminaria saccharina) and other red/brown seaweeds communities on sublittoral sediment*** either	SS.SMp.KSwSS
	sugar kelp and mixed filamentous and/or foliose **red seaweeds**	SS.SMp.KSwSS.LsacR
	There are sub-biotopes based on the amount of wave and tidal exposure	……go to **C312**
	or	
	sugar kelp and mermaids tresses in shallow, sheltered, tide- free, sandy mud and gravel. Sea lettuce (Ulva) and small numbers of red and brown seaweeds beneath the kelp. Northerly distribution	SS.SMp.KSwSS.LsacCho
	or	
	sugar kelp with understorey of red, brown and green seaweeds. The distinguishing red seaweed is *Gracilaria gracilis* which is unlikely to be recognised by most Seasearch surveyors. Brown fan weed (*Dictyota dichotoma)* is likely to be recorded and some mermaid's tresses (*Chorda filum*) though less than above. This biotope has a southerly distribution and is found in estuarine locations with variable salinity	SS.SMp.KSwSS.LsacGraVS
	or	
	sugar kelp on stony mixed sediment with frequent shore urchins (*Psammechinus miliaris*) and scattered horse mussels (*Modiolus modiolus*) in areas of variable salinity. Northerly distribution.	SS.SMp.KSwSS.LsacMxVS

C312 (C311)	**sugar kelp and mixed** filamentous and/or foliose **red seaweeds**	SS.SMp.KSwSS.LsacR
	there are 4 sub-biotopes:	
	either	
	red seaweeds and kelps on **tide-swept, mobile, cobbles and pebbles**	SS.SMp.KSwSS.LsacR.CbPb
	or	
	shallow community of **sugar kelp and robust red seaweeds on gravel and coarse sand** with some pebbles in slightly less exposed areas than above	SS.SMp.KSwSS.LsacR.Gv
	or	
	shallow community of **sugar kelp and filamentous red seaweeds on sand** and slightly gravelly sand with weak tidal streams	SS.SMp.KSwSS.LsacR.Sa
	or	
	slightly deeper community of sugar kelp and red	SS.SMp.KSwSS.LsacR.Mu

	seaweeds on sheltered sandy, **gravelly mud** with weak tidal streams. Very similar to above and distinguished mainly by the sediment composition		
C4 (C1)	***Sublittoral sediments other than animal beds or seaweed dominated sediment*** Does the sediment comprise: either **coarse sediment** – includes coarse sand, gravel, pebbles and cobbles. Often unstable due to tidal currents or wave exposure. Open coast or tide-swept channels. Few seaweeds or **sand** – clean medium to fine sand or slightly muddy sand in areas with some tidal current of wave action which limits silt content or **mud** – cohesive mud and sandy mud in sheltered areas (harbours, sea lochs, estuaries) or in deep water offshore or **mixed sediments-** a mixture of sediments which are heterogeneous or poorly sorted such as muddy gravelly sand of cobbles and pebbles in or lying on sand, gravel or mud. It does not include mixtures of rock and sediment sometimes identified as mixed ground on Seasearch forms. Mixed ground such as sediment with boulders would not fall within a single biotope and might need to be split with two biotopes assigned, each covering part of the sample.	SS.SCS SS.SSa SS.SMu SS.SMx	…go to **C5** …go to **C6** …go to **C7** …go to **C8**
C5 (C4)	***Coarse sediment (unstable cobbles, pebbles, gravel and coarse sand)*** the coarse sediment biotope complexes are defined largely by depth and are: either **shallow clean** gravel and pebbles in estuaries and other areas with **variable salinity**. Sparse fauna including shore crabs (*Carcinus maenas*) and gobies (*Pomatoschistus spp)* or **coarse sand, gravely sand, pebbles and gravel in the infralittoral zone** (no seaweeds here but generally down to 15m) . Moderately exposed and subject to disturbance by wave action or tidal streams. Sand mason worms (*Lanice conchilega*) may be abundant or **tide-swept coarse sand, gravel and pebbles in the circalittoral zone** (generally below 15m) or **deep offshore coarse sediments** – biotopes not covered here as they are unlikely to be visited by Seasearch surveyors	SS.SCS SS.SCS.SCSVS SS.SCS.ICS SS.SCS.CCS SS.SCS.OCS	 go to **C51** go to **C52**
C51 (C5)	***infralittoral coarse sediment*** coarse sand, gravelly sand, pebbles and gravel in the infralittoral zone (generally down to 15m) . Moderately exposed and subject to disturbance by wave action or tidal streams. There are 7 biotopes within this complex defined mainly by infauna which will not be available on a Seasearch form. Unless one of the two following fits then stick at the biotope complex level	SS.SCS.ICS	

	sparse fauna on extremely exposed or exposed clean rounded unstable pebbles and stones	SS.SCS.ICS.SSh	
	dense sand mason worms (*Lanice conchilega*) in coarse to medium gravelly sand where there are strong tidal streams or wave action	SS.SCS.ICS.SLan	

C52 (C5)	***circalittoral coarse sediment*** tide-swept coarse sand, gravel and pebbles in the circalittoral zone (generally below 15m). There are 5 biotopes in this complex only two of which are likely to be identifiable based on Seasearch data. Unless one of the following fits then stick at the biotope complex level	SS.SCS.CCS	
	keelworms (*Pomatoceros*), with barnacles and bryozoan crusts on unstable circalittoral **cobbles and pebbles**. (there is a similar biotope in slightly more stable areas - see **C81 -** SS.SMx.CMx.FluHyd)	SS.SCS.CCS.PomB	
	dense gravel sea cucumbers (*Neopentadactyla mixta)* in clean gravels, maerl and sand	SS.SCS.CCS.Nmix	

C6 (C4)	***Sands and muddy sands (clean medium to fine sand or slightly muddy sand in areas with some tidal current of wave action which limits silt content)*** There are 7 biotope complexes within this category defined by depth and types of sand and 17 biotopes, many defined by infauna. In most cases you will not be able to go beyond the biotope complex level based on Seasearch data. The biotope complexes are:	SS.SSa	
	sublittoral sand in **low or reduced salinity (lagoons)** Unlikely to be covered in Seasearch surveys	SS.SSa.SSaLS	
	sublittoral sand in **estuaries or other areas of variable salinity.** The 3 biotopes within this complex are based on infauna and unlikely to be identified in Seasearch surveys	SS.SSa.SSaVS	
	infralittoral fine sand (generally down to not more than 15m) either on the open coast or in tide-swept channels. There are 4 biotopes, 2 of which may be identifiable from Seasearch data	SS.SSa.IFiSa	go to **C61**
	infralittoral muddy sand (generally down 15m) containing tube worms, bivalves and sea potatos There are 4 biotopes, 2 of which may be identifiable from Seasearch data	SS.SSa.IMuSa	go to **C62**
	circalittoral fine sand (generally deeper than 15m) either on the open coast or in tide-swept channels. May contain slender sea pens (*Virgularia*), burrowing anemones (*Cerianthus lloydii*), and brittlestars (*Amphiura* and *Ophiura* spp.) There are 2 biotopes, neither of which will be identifiable from Seasearch data	SS.SSa.CFiSa	
	circalittoral muddy sand (generally deeper than 15m) in exposed or moderately exposed locations with tube worms,	SS.SSa.CMuSa	

	bivalves, brittlestars (*Amphiura* and *Ophiura* spp.) and sand stars (*Astropecten irregularis*) There are 2 biotopes, one of which may be identifiable from Seasearch data **offshore circalittoral sand** – biotopes not covered here as they are unlikely to be visited by Seasearch surveyors:	 SS.SSa.OSa	go to **C63**

C61 (C6)	**infralittoral fine sand** (generally down to not more than 15m) either on the open coast or in tide-swept channels. The two biotopes which may be identifiable from Seasearch data are: infralittoral **mobile clean sand** with sparse fauna. The sand often formed into dunes.There may be mobile species such as hermit crab (*Paguridae*), harbour crab (*Liocarcinus depurator*) shore crab (*Carcinus maenas*) and common starfish (*Asterias rubens*) on the surface but little infauna and infralittoral **sand with cobbles and pebbles**, exposed to **strong tidal streams** with **hydroids** especially helter-skelter hydroid (*Hydrallmania falacata*) and squirrel's tail (*Sertularia* spp.). Stable cobble and pebbles may support hornwrack, barnacles and finger bryozoans	SS.SSa.IFiSa SS.SSa.IFiSa.IMoSa SS.SSa.IFiSa.ScupHyd

C62 (C6)	**infralittoral muddy sand** (generally down 15m) containing tube worms, bivalves and sea potatos The 2 biotopes which may be identifiable from Seasearch data are: **sea potato** (*Echinocardium cordatum*) and **razor shell** (*Ensis* sp.) communities. However note that these species may also occur in other biotopes and **lugworms** (*Arenicola marina*) with hermit and harbour crabs, sand mason worms and burrowing anemones	SS.SSa.IMuSa SS.SSa.IMuSa.EcorEns SS.SSa.IMuSa.ArelSa

C63 (C6)	***circalittoral muddy sand*** the one biotope which can be identified from Seasearch surveys is: **dense burrowing brittlestars** (*Amphiura brachiata*) **and sand stars** (*Astropecten irregularis*), with common starfish, sand brittlestars and sea potatos	SS.SSa.CMuSa SS.SSa.CMuSa.AbraAirr

C7 (C4)	***mud*** cohesive mud and sandy mud in sheltered areas (harbours, sea lochs, estuaries) or in deep water offshore. There are 7 biotope complexes within this category defined by depth and types of sand and 33 biotopes, many defined by infauna. In most cases you will not be able to go beyond the biotope complex level based on Seasearch data. The biotope complexes are: sublittoral mud in **low or reduced salinity (lagoons)** Unlikely to be covered in Seasearch surveys sublittoral mud in **estuaries or other areas of variable salinity.** The 7 biotopes within this complex are based on infauna and unlikely to be identified in Seasearch surveys	SS.SMu SS.SMu.SMuLS SS.SMu.SMuVS	

	infralittoral sandy mud (generally down to not more than 15m) in sheltered bays and sheltered areas of open coast The 6 biotopes within this complex are based on infauna and unlikely to be identified in Seasearch surveys	SS.SMu.ISaMu	
	infralittoral fine mud (generally down 15m) in extremely sheltered area with very weak tidal currents in sea lochs, rias and harbours. Dense populations of lugworms, the burrowing opisthobranch Philine aperta and burrowing sea cucumbers are characteristic. There are 5 biotopes, 4 of which may be identifiable from Seasearch data	SS.SMu.IFiMu	go to C**71**
	circalittoral sandy mud (generally deeper than 10m) in areas with weak tidal streams in deeper areas of bays an inlets or offshore from less wave exposed coasts. Slender sea pens (*Virgularia*) and brittlestars (*Amphiura*) are characteristic There are 5 biotopes, one of which may be identifiable from Seasearch data	SS.SMu.CSaMu	go to **C72**
	circalittoral fine mud (generally deeper than 15m) on open coasts or in sea lochs. Characteristic species are sea pens, burrowing anemones, brittlestars (*Amphiura* spp.) and scampi (*Nephrops norvegicus*) There are 3 biotopes, one of which may be identifiable from Seasearch data and has a sub biotope	SS.SMu.CFiMu	go to **C73**
	offshore circalittoral mud – mud in depths of more than 50m. Biotopes not covered here as they are unlikely to be visited by Seasearch surveyors	SS.SMu.OMu	

C71 (C7)	***infralittoral fine mud*** The 4 biotopes which may be identifiable from Seasearch data are:	SS.SMu.IFiMu
	in **very shallow** (up to 5m) extremely sheltered **very soft mud**. **Lugworm casts** common with shore crabs, common starfish and burrowing sea cucumbers	SS.SMu.IFiMu.Are
	the burrowing opisthobranch ***Philine aperta* and slender seapens** (*Virgularia*), in shallow, stable, sheltered mud	SS.SMu.IFiMu.PhiVir
	dense beds of the burrowing sea cucumber ***Ocnus planci*** in sheltered conditions such as sea lochs	SS.SMu.IFiMu.Ocn
	sublittoral **soft anoxic mud with a bacterial mat** of *Beggiatoa* sp. This may be the result of poor water exchange in some sea lochs or the result of nutrient enrichment from fish farm wastes. Little other life	SS.SMu.IFiMu.Beg

C72 (C7)	***circalittoral sandy mud*** The 1 biotope which may be identifiable from Seasearch data is:	SS.SMu.CSaMu.
	slender sea pens (*Virgularia mirabilis*) in **fine sandy mud** with sand brittlestars (*Ophiura* spp.) and king scallops. A widespread biotope in sea lochs	SS.SMu.CSaMu.VirOphPmax

C73 (C7)	***circalittoral fine mud*** The 1 biotope which may be identifiable from Seasearch data is:	
	mud plains in sea lochs below 15m with **burrows and mounds and slender and phosphorescent sea pens** *(Virgularia mirabilis & Pennatula phosphorea).* Burrowing animals include scampi (*Nephrops norvegicus*), burrowing anemones (*Cerianthus lloydii*) and fireworks anemone (*Pachycerianthus multiplicatus*)	SS.SMu.CFiMu.SpnMeg
	There is a sub-biotope	
	as above but with the addition of **tall sea pens** (*Funiculina quadrangularis*)	SS.SMu.CFiMu.SpnMeg. Fun

C8 (C4)	***mixed sediments***	SS.SMx
	a mixture of sediments which are heterogeneous or poorly sorted such as muddy gravelly sand of cobbles and pebbles in or lying on sand, gravel or mud.	
	There are 5 biotope complexes in this broad habitat which are defined by depth, and 13 biotopes 8 of which may be identified using Seasearch data. These are mostly based on conspicuous species that have already been covered in the animal bed section in **C2** above	
	The biotope complexes are:	
	sublittoral mixed sediment in **low or reduced salinity (lagoons)**	SS.SMx.SMxLS
	Unlikely to be covered in Seasearch surveys	
	sublittoral mixed sediment in **estuaries or other areas of variable salinity.** There are two biotopes, one of which contains slipper limpets (*Crepidula fornicata*) and is found in **C24** above	SS.SMx.SMxVS
	infralittoral mixed sediment – shallow mixed sediments with various animal-dominated communities and few seaweeds	SS.SMx.IMx
	The 5 biotopes within this complex contain 4 based on conspicuous species which should enable them to be identified from Seasearch data They are based on	
	slipper limpets (*Crepidula fornicata*)	……go to **C24**
	peacock worms (*Sabella pavonina*)	SS.SMx.IMx.SpavSpAn
	flame shells (*Limaria hians*)	SS.SMx.IMx.IMxLim
	oysters (*Ostrea edulis*)	SS.SMx.IMx.Ost
	If your habitat does not contain these species then stick with the biotope complex or reconsider the nature of the sediment	
	circalittoral mixed sediment (generally deeper than 15m) containing mixed muddy gravelly sands, or a poorly sorted mixture of shell, cobbles and pebbles embedded in or lying on mud. There is a wide range of animal communities.	SS.SMx.IMx.CMx
	There are 5 biotopes, 4 of which may be identifiable from Seasearch data	……..go to **C81**

	offshore circalittoral mixed sediment in depths unlikely to be visited by Seasearch surveyors	SS.SMx.IMx.OMx

C81 (C8)	***circalittoral mixed sediment*** (generally deeper than 15m) containing mixed muddy gravelly sands, or a poorly sorted mixture of shell, cobbles and pebbles embedded in or lying on mud. There is a wide range of animal communities. The 4 biotopes which may be identifiable from Seasearch data are:	SS.SMx.CMx
	burrowing sea anemones (*Cerianthus lloydii, Cereus pedunculatus, Mesacmaea mitchellii* or *Aureliania heterocera*) on plains of sandy muddy gravel	SS.SMx.CMx.ClloMx
	There is a **sub-biotope** where there are more **pebbles** embedded in the sediment and colonised by hydroids, particularly the **antenna hydroids** (*Nemertesia spp*.)	SS.SMx.CMx.ClloMx.Nem
	burrowing sea anemones (*Cerianthus lloydii*) with sparse horse mussels (*Modiolus modiolus*) and **burrowing sea cucumbers** on mud or muddy gravel in sea lochs	SS.SMx.CMx.ClloModHo
	hornwrack (*Flustra foliacea*) and **helter-skelter hydroid** (*Hydrallmania falacata*) on boulders, cobbles or pebbles with gravel and sand. This biotope is a transitional one between scoured rock and true sediment habitats. Other hydroids, dahlia anemones, dead men's fingers and finger bryozoans may also be present	SS.SMx.CMx.FluHyd
	In areas with **less boulders and more sand** the **squirrel tail hydroid** (*Sertularia cupressina*) may be prominent	SS.SSa.IfSa.ScupHyd
	dense **brittlestar beds** (*Ophiothrix fragilis* or *Ophiocomina nigra*)on mixed sediment	SS.SMX.CMx.OphMx

5. ENTERING BIOTOPE DATA INTO MARINE RECORDER

[The following notes have been adapted from *Marine Recorder Guidance Notes: inputting Seasearch data* by Kate Northen, 2003].

There is a separate tab for entering biotope data into the Marine Recorder database. You can find it by following the path: Survey/Events/Samples/Biotope.

By (left) clicking on the **Biotope** tab, you will open the Biotope screen. You can only add one biotope (or biotope complex) at a time. To add more than one entry, repeat the process described below for each biotope.

1. **Add Biotope** button — You are now in the **Biotope determination** screen.

2. **Biotope** — Use the **Pick** button to select the biotope classification (MNCR 04.05); left click the mouse over the type you want to select. This will return you to the **Biotope determination** screen and your selection should be displayed in the yellow **biotope** box.

To select a biotope code use the **Pick** button to select 'MNCR classification'. In the **Biotope determination** screen use the drop-down list to select the biotope code.

3. **Biotope qualifier** — Use the drop-down list to select the appropriate option.

Certain match; part record -– Where the biotope describes only part of the habitat; i.e. if more than one biotope has been selected;

Certain match; whole record – Where biotope describes the entire habitat;

Uncertain match; *part record* & *Uncertain match; whole record* – Use these options if you have doubts about the biotope code you have allocated.

Note that if you have selected *part record* you can enter a second biotope for the remainder of the sample.

4. **Date** — The should be the date of assigning the biotope (which should also be entered onto the Survey form), rather than the date of the dive itself.

5. **Determined by** — Your name (or the name of the person who has identified the biotope) rather than the name of the person who filled in the Seasearch form.

6. **Determiner status** — Select 'Post survey assessor/analyst'. Now click **Save**.

Fig. 3. Selected screen(s) from the Marine Recorder database, showing the biotope 'tab'

APPENDIX 1 Definitions of Terms and abbreviations used

The definitions given here (as indicated by asterisks) are based on those found in the Joint Nature Conservation Committee's *Marine Nature Conservation Review: rationale and methods*, edited by Dr Keith Hiscock (1996).

Algal crusts	Encrusting algae, which grow as thin discrete patches on rocky substrata. Typically able to tolerate low light conditions, so able to extend into the lower circalittoral zone. See also 'coralline crusts'
Bryozoan turf	Sessile, erect bryozoa such as *Crisia* spp., *Cellaria* spp. or *Bugula* spp. covering the substratum. Often mixed with small hydroids too.
Circalittoral	Zone characterised by animal-dominated communities, found below the zone dominated by algae (the infralittoral). The zone itself can be split into two sub-zones: the upper circalittoral (where foliose red algae are present, but kelp is absent); and the lower circalittoral (where foliose red algae are absent). The depth at which the circalittoral zone begins is directly dependent on the intensity of light reaching the seabed.
Coralline crusts *	Calcareous red alga impregnated with calcium carbonate. Form a very hard, cement-like crust on rocky substrata. May appear pink, purple or white (where bleached).
Exposure *	The degree of wave action on an open shore, governed by the distance of open sea over which the wind may blow to generate waves (the fetch) and the strength and incidence of the winds. Expressed as a descriptive scale which includes the following categories: ultra sheltered, very sheltered, sheltered, moderately exposed, exposed, very exposed and extremely exposed.
Faunal crusts	Animal species which encrust the substratum such as certain bryozoa.
Faunal turf	A turf (typically low-lying but can include taller species) comprised of sessile , erect animal species, in particular bryozoans and hydroids, but also anemones, sponges and sea squirts.
Infralittoral	Zone dominated by algal-dominated communities. The zone itself can be split into two sub-zones: the upper infralittoral (where kelp plants form a dense 'forest', with occasional foliose algae growing on the shaded rock underneath the kelp canopy); and the lower infralittoral (where kelp plants are sparser and foliose brown and red algae dominate).
Salinity *	Measure of the concentration of dissolved salts in seawater, normally expressed as parts per thousand (‰). Freshwater is regarded as <0.5 ‰, seawater as >30 ‰ and brackish water as intermediate.
Scour *	The effect of abrasion, usually by sand or gravel, on the seabed.
Silt *	Fine-grained sediment particles, ranging in size from 0.004 mm to 0.0625 mm.
Sublittoral	The zone below the littoral (shore) zone. Whilst the sublittoral fringe is exposed to the air on low water spring tides, the rest of the sublittoral remains under water.
Sublittoral fringe *	The upper part of the sublittoral zone, which is uncovered by the tide. On hard substrata, the zone is characterised by the kelps *Laminaria digitata* and *Alaria esculenta*. The lower limit of this zone is marked by the upper limit of the truly sublittoral kelp *Laminaria hyperborea*, forming the upper infralittoral zone.
Substratum/a *	Material available for colonisation by plants and animals. Anglicised form is 'substrate'.
Tide-swept	Affected by strong, alternating, water movements created by the rise and fall of the tide. 'Current' (as opposed to tidal streams) relates to a steady flow in a particular direction and refers to a residual flow after any tidal streams have been removed.
Wave-exposed *	Open coasts facing away from prevailing winds but with a long fetch, and where strong winds are frequent. Note that other exposure categories include: extremely exposed, very exposed, exposed, sheltered, very sheltered and ultra-sheltered.
Wave-sheltered *	Coasts which may face the prevailing wind but with a short fetch (<20km) or extensive shallow area offshore, or may face away from prevailing winds. Note that other exposure categories include: extremely exposed, very exposed, exposed, sheltered, very sheltered and ultra-sheltered.

Abbreviations

CODE	MEANING	CODE	MEANING
Aalb	*Abra alba* (bivalve)	IR	Infralittoral rock
Aasp	*Ascidiella aspersa* (fluted sea squirt)	K	Kelp
Abra	*Amphiura brachiata* (brittlestar)	L	Low energy (wave/tide sheltered)
Act	*Actinothoe (sphyrodeta)* (white-striped anemone)	Lan	*Lanice* (*conchilega*) (sand mason worm)
Adia	*Alcyonidium diaphanum* (finger bryozoan)	Ldig	*Laminaria digitata* (oar weed)
Adig	*Alcyonium digitatum* (dead man's fingers)	LgAs	Large (solitary) ascidians
Aglo	*Alcyonium glomeratum* (red fingers)	Lhyp	*Laminaria hyperborea* (cuvie)
Al	Algae/algal	Loch	*Laminaria ochroleuca* (golden kelp)
Ala	*Alaria esculenta* (dabberlocks)	Lsac	*Laminaria saccharina* (sugar kelp)
Amen	*Ascidia mentula* (red sea squirt)	LIR	Low energy infralittoral rock
An	Anemones	M	Moderate energy (moderately wave/tide exposed)
Ant	*Antedon* sp. (featherstar)	Mdis	Musculus discors *(mussel)*
Are	*Arenicola marina* (lugworm)	Mod	Modiolus (modiolus*) (horse mussel)*
As	Ascidians	Mol	Molgula *sp. (sea squirt)*
Axi	Axinellid sponges	Mrl	*Maerl*
B	Barnacles	Msen	Metridium senile *(plumose anemone)*
Beg	*Beggiatoa* (bacterial mat)	Mu	*Mud/muddy*
Bo	Boulders	MuSa	*Muddy sand*
Br	Brachiopods	Mx	*Mixed sediments (mixtures of gravel, sand & mud, often with shell, pebble and cobble)*
Bri	Brittlestars	Myt	Mytilus edulis *(edible mussel)*
Bug	Bugula spp	Nem	*Nemertesia* spp. (hydroid)
By	Bryozoans	Nmix	*Neopentadactyla mixta* (gravel sea cucumber)
C	Circalittoral	O	Offshore
Car	*Caryophyllia smithii* (Devonshire cup coral)	Oph	*Ophiura* spp. (brittlestar)
CC	Crustose coralline algae	Ov	Overhangs
Cer	*Cerastoderma* sp. (cockle)	Pid	Piddocks (bivalves)
Cho	*Chorda filum* (mermaid's tresses)	Pk	(kelp) Park
Cio	*Ciona intestinalis* (yellow ringed sea squirt)	Pom	*Pomatoceros* sp (keelworm)
Cllo	*Cerianthus lloydii* (burrowing anemone)	Prot	*Polyides rotundus* (red seaweed)
Cor	Corallinaceae/coralline	R	Red (foliose) seaweeds
Cre	*Crepidula fornicata* (slipper limpet)	R	Rock
Cri	Crisiids (turf-forming bryozoans)	S	Salinity (Full, Varibale, Reduced, Low)
CrSp	Crustose sponges	S	Sediment
Cv	Caves	S	Sublittoral
Cvir	*Corynactis viridis* (jewel anemone)	S	Surge (gully)
Den	*Dendrodoa grossularia* (gooseberry sea squirt)	Sa	Sands/sandy
Des	*Desmarestia* spp. (landlady's wig or mermaid's hair)	Sab	*Sabellaria*
Dp	Deep (lower circalittoral)	Sac	*Saccorhiza polyschides* (furbelows)
Dys	*Dysidea (fragilis)* (goosebump sponge)	Sag	*Sagartia* (*elegans*) (elegant anemone)
Ec	Echinoderms	SaMu	Sandy mud
Ecor	*Echinocardium cordatum* (common heart urchin)	Sar	*Sargassum* (*muticum*) (japweed)
ErSp	Erect sponges	Sed	Sediment
Eun	*Eunicella* (*verrucosa*) (pink sea fan)	SfR	Soft rock (e.g. chalk or clay)
Fa	Fauna/faunal	SG	Surge gully
Fi	Fine (sand or mud)	Sgr	Seagrass
Fil	Filamentous (seaweeds)	Sm	Small
Flu	*Flustra* (*foliacea*) (hornwrack)	Sp	Sponges
Fo	Foliose (seaweeds)	Spav	*Sabella pavonina* (peacock worm)
Fou	Fouling	SSpi	*Sabellaria spinulosa*
Ft	Forest (kelp)	Sund	*Sagartiogeton undatus* (anemone)
Fun	*Funiculina* (*quadrangularis*) (tall sea pen)	Sw	Seaweeds
Fur	*Furcellaria* (*lumbricalis*) (red seaweed)	Swi	*Swiftia pallida*
G	Gully (surge gully)	T	Tide-swept
Gra	*Gracilaria* spp. (filamentous red seaweeds)	Tub	*Tubularia* (*indivisa*) (oaten pipe hydroid)
GzFt	Grazed (kelp) forest	Urt	*Urticina* (anemone)
GzPk	Grazed (kelp) park	Vir	*Virgularia* (*mirabilis*) (slender sea pen)
H	High energy (very wave/tide exposed)	VS	Variable salinity
H	Hydroids	Vt	Vertical rock
Hal	*Halidrys* (*siliquosa*) (pod weed)	X	Mixed substrata
Hbow	*Halichondria bowerbanki* (sponge)	XFa	Mixed fauna
Hia	*Hiatella* (*arctica*) (red nose)	XFoR	Mixed foliose red seaweeds
HIR	High energy infralittoral rock	XK	Mixed kelps
Hocu	*Haliclona oculata* (mermaid's glove sponge)	Zmar	*Zostera marina* (eelgrass)
Hyd	*Hydrallmania* (*falcata*) (helter-skelter hydroid)		