Inshore Special Area of Conservation (SAC): Lyme Bay and Torbay

SAC Selection Assessment

Version 2.5

Version Control

Version and Issue date	Amendments made	Issued to and date
2.5 6th August 2010	Text amendments from pSAC to cSAC status	Submission to Europe (9th August 2010)
2.4 14th May 2010	Minor text amendments	Natural England Executive Board
2.3 6th May 2010	Text amendments	To JM and GT to QA
2.2 5th May 2010	Text amendments	
2.1 29th April 2010	New maps and text amendments	
2.0 21st April 2010	New document for Lyme Bay and Torbay SAC drafted following formal consultation on Poole Bay to Lyme Bay cSAC	N2K Project manager and JB

1. Introduction

This document provides detailed information about the Lyme Bay and Torbay candidate SAC (cSAC) and evaluates its interest features according to the Habitats Directive selection criteria and guiding principles.

The advice contained within this document is produced to fulfil requirements of Natural England under the Conservation of Habitats and Species Regulations 2010, relating to the conservation of natural habitat types and species through identification of Special Areas of Conservation (SACs) in UK waters (EU, 2003; EC, 2007). Under these Regulations, Natural England is required to provide advice to Defra to enable the Secretary of State and Competent Authorities to fulfil their obligations under the Regulations.

Sites eligible for designation as Special Areas of Conservation (SACs) are selected on the basis of the criteria set out in Annex III (Stage 1) to the Habitats Directive and relevant scientific information. SACs are considered only if they host a Habitats Directive Annex I habitat or Annex II species. Socio-economic factors are not taken into account in the identification of sites to be proposed to the European Commission[1].

In addition to information on the Annex I habitats, this document contains: i) a map of the site, ii) its name, location and extent, iii) the data resulting from application of the criteria specified in Annex III (Stage 1) to the Habitats Directive and iv) a glossary of terms mentioned in the text. Natural England has adhered to the format established by the Commission for providing site information. This format is set out in the 'Natura 2000 Standard data form' (CEC, 1995) (prepared by the European Topic Centre for Biodiversity and Nature Conservation on behalf of the European Commission to collect standardised information on SACs throughout Europe).

[1] Following European Court of Justice 'First Corporate Shipping' judgement C-371/98 (7 November 2000)

2. Lyme Bay and Torbay: SAC Selection Assessment

1. Site name Lyme Bay and Torbay	**2. Site centre location** Degrees and minutes**: 2° 58' 11"W 50° 39' 04"N** Decimal degrees: **2.96°W 50.63° N** (Datum: WGS84)
3. Site surface area (Mackerel Cove to Dartmouth and Lyme Bay reefs) **31,248 ha; 312 sq km** (UTM Zone 30 Northern hemisphere WGS84)	**4. Biogeographic region** Atlantic

3. Interest feature(s) under the EU Habitats Directive

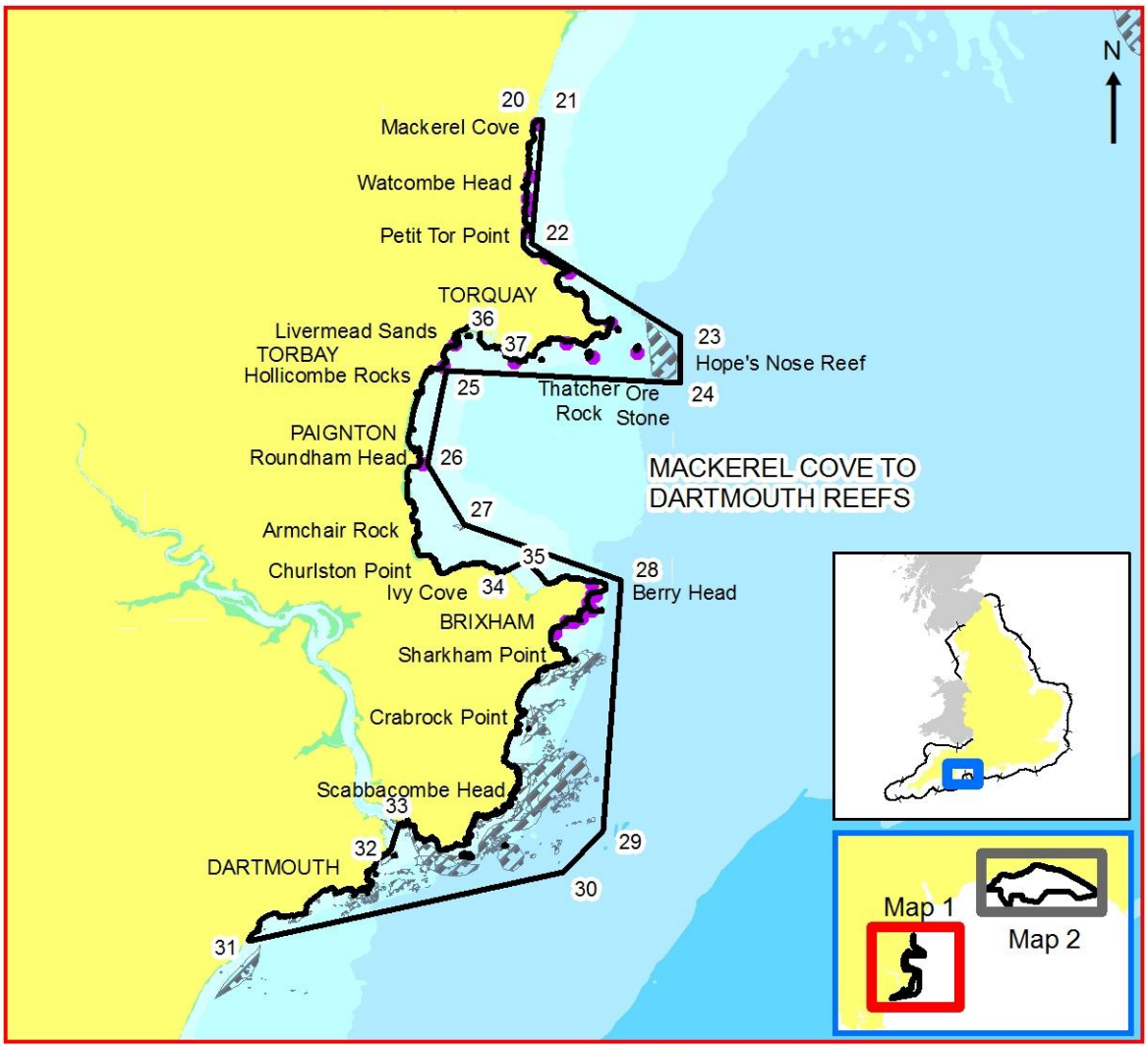
This site is listed for the features set out below. For further information please see European Commission, DG Environment, 2007: Interpretation Manual of European Union Habitats. EUR 27, July 2007:

http://ec.europa.eu/environment/nature/legislation/habitatsdirective/docs/2007_07_im.pdf

1170 Reefs.

8330 Submerged or partially submerged sea caves.

4. Maps of candidate SAC boundary and location of features[2]



candidate Special Area of Conservation
Lyme Bay and Torbay
candidate Special Area of Conservation
Reefs
Sea caves
Special Areas of Conservation
England 12nM Territorial Seas Limit
Depth Areas
Drying
<=10m
<=20m
<=50m
<=100m
Land

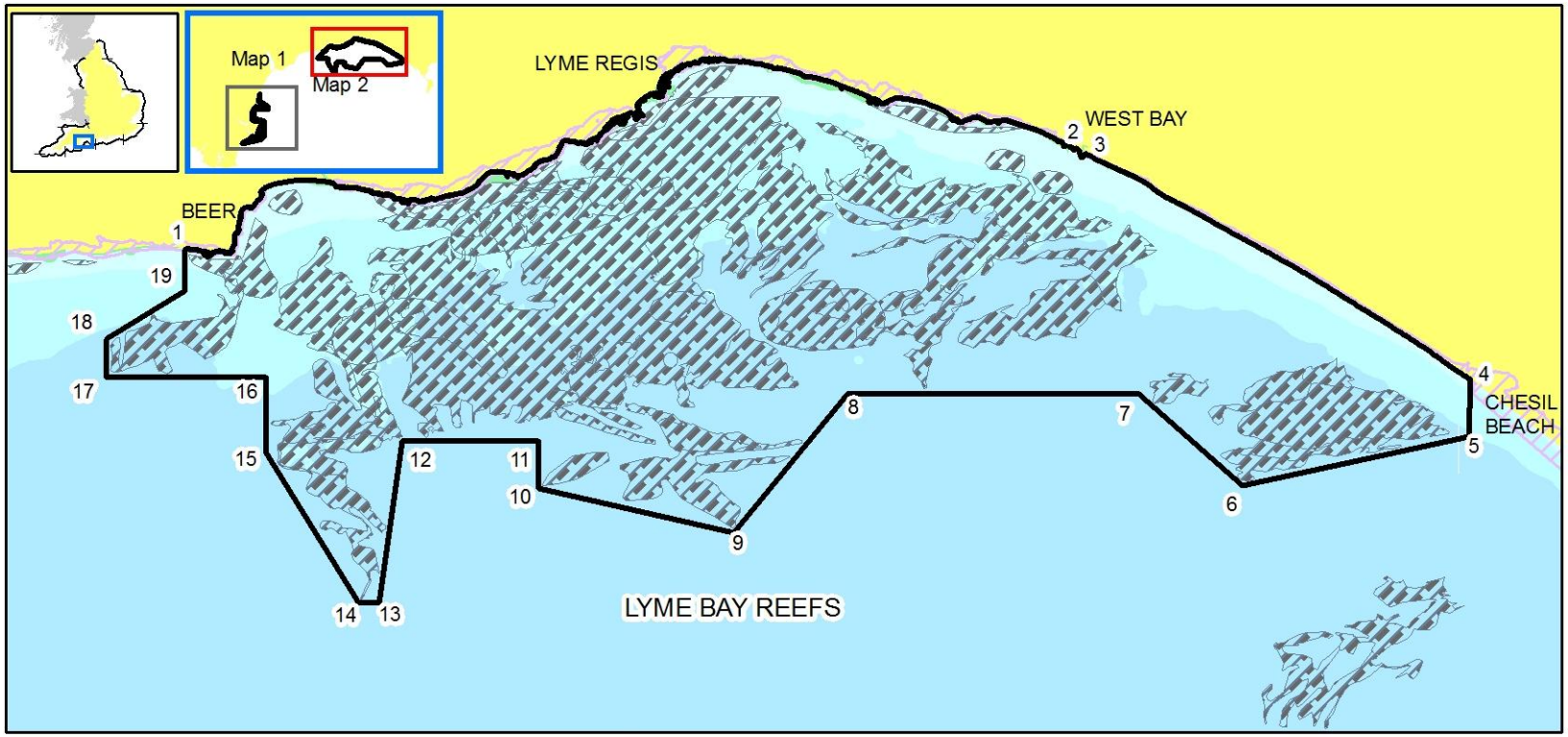
EU Site Code: UK0030372
Version number: 2.0
Longitude: 2° 56' 11" W
Latitude: 50° 39' 4"N
Projection: UTM 30N (WGS84)
Area of SAC: 312.47 sq km 31247.79 ha
Theme ID: 1452105
Grid Ref: SY314821
Version: 9.0
Plotted: 22/07/2010
Plot ID: 6.0

Scale 1:200,000 Map 1 of 2
0 1.25 2.5 5 Kilometers

Candidate Special Area of Conservation Directive 92/43/EEC
Submitted to the EC by the Secretary of State for Environment, Food and Rural Affairs. Date: 20/08/2010
Depth areas © British Crown and SeaZone Solutions Limited. All rights reserved. Product licence No. PGA062006.004. This product has been derived in part from material obtained from the UK Hydrographic Office (UKHO) with permission of the Controller of Her Majesty's Stationary Office and the UKHO.
NOT TO BE USED FOR NAVIGATION
This map is based upon Ordnance Survey material with permission of Ordnance Survey on behalf of Her Majesty's Stationary Office © Crown copyright. All rights reserved. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. Licence number 100022021.2010

NATURAL ENGLAND

[2] Larger copies of maps are available on request from Natural England, Regulatory Services, Floor 1 West, Northminster House, Peterborough. PE1 1UA



candidate Special Area of Conservation
Lyme Bay and Torbay

- candidate Special Area of Conservation
- Special Areas of Conservation
- Reefs
- England 12nM Territorial Seas Limit

Depth Areas

- Drying
- <=10m
- <=20m
- <=50m
- <=100m
- Land

EU Site Code: UK0030372
Version number: 2.0
Longitude: 2° 56' 11" W
Latitude: 50° 39' 4"N
Projection: UTM 30N (WGS84)
Area of SAC: 312.47 sq km 31247.79 ha

Theme ID: 1452105
Grid Ref: SY314821
Version: 9.0
Plotted: 22/07/2010
Plot ID: 6.0

0 1.25 2.5 5 Kilometers

Scale 1:200,000 Map 2 of 2 N

Candidate Special Area of Conservation Directive 92/43/EEC. Submitted to the EC by the Secretary of State for Environment, Food and Rural Affairs. Date: 20/08/2010

NATURAL ENGLAND

Location of boundary nodes*

Point No	Lat	Long	Point No	Lat	Long
1	50º 41' 10"	-3º 6' 50"	20	50º 30' 44"	-3º 30' 34"
2	50º 42' 31"	-2º 45' 50"	21	50º 30' 44"	-3º 30' 28"
3	50º 42' 32"	-2º 45' 49"	22	50º 28' 57"	-3º 30' 42"
4	50º 39' 12"	-2º 36' 48"	23	50º 27' 37"	-3º 27' 17"
5	50º 38' 21"	-2º 36' 51"	24	50º 26' 56"	-3º 27' 16"
6	50º 37' 38"	-2º 42' 8"	25	50º 27' 6"	-3º 32' 37"
7	50º 39' 0"	-2º 44' 32"	26	50º 25' 44"	-3º 33' 1"
8	50º 39' 1"	-2º 51' 20"	27	50º 24' 52"	-3º 32' 10"
9	50º 36' 57"	-2º 53' 60"	28	50º 24' 4"	-3º 28' 37"
10	50º 37' 37"	-2º 58' 33"	29	50º 20' 26"	-3º 28' 58"
11	50º 38' 19"	-2º 58' 33"	30	50º 19' 50"	-3º 29' 52"
12	50º 38' 19"	-3º 1' 45"	31	50º 18' 47"	-3º 36' 59"
13	50º 35' 55"	-3º 2' 17"	32	50º 20' 7"	-3º 33' 48"
14	50º 35' 55"	-3º 2' 45"	33	50º 20' 30"	-3º 33' 36"
15	50º 38' 9"	-3º 4' 55"	34	50º 24' 20"	-3º 30' 47"
16	50º 39' 16"	-3º 4' 55"	35	50º 24' 11"	-3º 31' 12"
17	50º 39' 16"	-3º 8' 39"	36	50º 27' 28"	-3º 31' 44"
18	50º 39' 50"	-3º 8' 39"	37	50º 27' 26"	-3º 31' 44"
19	50º 40' 33"	-3º 6' 49"			

*Landward boundaries follow OS mean low water line

Location of sea caves

Name	Grid reference
Mackerel Cove Sea Caves	SX 930 691
Watcombe Sea Caves	SX 928 677
Smuggler's Hole	SX 927 671
Shag Cliff Caves	SX 927 668
Petit Tor Caves	SX 927 662
Babbacombe Sea Cave	SX 932 655
Long Quarry Point Caves	SX 938 651
Hope's Nose Submarine Caves	SX 949 637
Ore Stone Cave	SX 956 629
Thatcher Rock Sea Cave	SX 944 628
Kilmorie Sea Cave	SX 937 632
London Bridge Sea Caves	SX 923 627
Corbyn's Head Sea Caves	SX 907 632
Livermead Head Sea Caves	SX 904 626
Roundham Head Sea Caves	SX 898 600
Berry Head Quarry Caves	SX 943 567
Southside Caves	SX 944 564
Compass Cave	SX 943 564
Berry Head Sea Cave no.1	SX 942 562
Oxley Head Cave	SX 943 560
North Durl Head caves	SX 940 558
Slater's Cave	SX 938 557
Durl Head Cave	SX 936 557
St Mary's Bay Cave	SX 933 554

5. Site summary

5.1 Reefs

The Lyme Bay and Torbay site lies off the south coast of England off the counties of Dorset and Devon. The site comprises of two main areas containing Annex I 'reef' and 'sea cave' habitat. The areas are described as (from east to west):

- Lyme Bay Reefs; and
- Mackerel Cove to Dartmouth Reefs.

Lyme Bay Reefs
The seabed in the Lyme Bay Reefs area is found to comprise a wide variety of reef features including:

- outcropping bedrock (including igneous, chalk, mudstone and limestone examples); and
- pebbles, cobbles and boulders.

The reef features extend over a large area. Unlike other sites within the Lyme Bay and Torbay site, they do not extend directly out from the coast but occur as outcropping bedrock slightly offshore. The softer sediment habitats are commonly found between the bedrock or cobble / boulder areas.

Mackerel Cove to Dartmouth Reefs
The reefs in the Mackerel Cove to Dartmouth area exhibit great geological variety. Between Dartmouth and Scabbacombe Head slate reef is present with occasional granite outcrop. The slate reefs represent complex topographic features characterised by steeply inclined bedrock rising vertically with deep gullies. The reefs present between Crabrock Point and Sharkham Point are formed from mud ledges which form 2m high rock ridges. The reef features surrounding Berry Head principally comprise limestone ridges, boulders and pinnacles. The complex reef features, including ridges, vertical drop-offs, pinnacles and deep gullies, support rich species assemblages. Within Torbay, the reefs comprise discrete areas associated with the many headlands and coves (and include from south to north: Brixham to Ivy Cove reefs, Churston Point, Armchair Rock, Roundham Head and Hollicombe rocks to Livermead sands). The reefs in Torbay have a more diverse composition with limestone outcrops recorded in the southern half of the bay, and sandstone in the upper half of the bay. Hope's Nose reef (including Thatcher Rock and the Ore Stone) are large areas of limestone reef extending around the northern headland of Torbay.
All of the reefs features present within this area are extensions of the coastal geology.

5.2 Sea Caves

A large number of infralittoral sea caves have been identified within Torbay and the surrounding coastline from Mackerel Cove in the north, to Sharkham Point in the south. Examples of the classical wave-eroded sea caves are found at all the sites (Proctor, 2009). They occur in several different rock types, and at levels from above the high water mark of spring tides down to permanently flooded caves lying in the infralittoral zone.

5.3 Lyme Bay and Torbay Annex I Habitat Comparison

5.3.1 Reef habitats

This site is situated mostly within the Western English Channel and Celtic Regional Sea (Defra, 2004). Listed below are existing SACs within these Regional Seas which contain Reefs as a qualifying Annex I habitat. The type of Reefs present are summarised in Table 5.1.

Table 5.1 Regional SACs comprising reef habitat

Site	Description of relevant qualifying features
Isles of Scilly complex SAC	Hard bedrock reef, both infralitttoral and circalittoral, in some cases extending well beyond 50 m depth. Exposure levels vary at this site: some reefs and very exposed, others sheltered. The surrounding waters are full salinity and the feature is subject to minimal coastal influence. The topographic complexity of the reefs is low. The south-westerly position of the islands leads to a range of warm-water species being present, including sunset cup-coral *Leptopsammia pruvoti*, pink sea-fans *Eunicella verrucosa*, and Weymouth carpet-coral *Hoplangia durotrix*.
Lundy SAC	A granite and slate reef system, exposed to a wide range of wave action and tidal stream strength. Combined with significant topographical variation, this has resulted in a diverse complex of biological communities. The full salinity reefs are both infralittoral and circalittoral (>50m depth), and are highly influenced by coastal processes. Several communities at their northern limit of distribution occur here. Fragile long-lived species, such as the soft coral *Parerythropodium coralloides*, sea-fan *Eunicella verrucosa* and erect branching sponges are present, as are all five British species of cup-coral.
Plymouth Sound & Estuaries SAC	Intertidal and subtidal low energy reefs, including some composed of limestone. This relatively soft rock is extensively bored by the bivalve *Hiatella arctica* and the spionid worms *Polydora* spp., and harbours a rich fauna. In the sublittoral this steep-sided reef is dominated by a dense hydroid and bryozoan turf with anemones and ascidians. The sublittoral is of particular importance for its kelp- and animal-dominated habitats. Abundant populations of the slow-growing, long-lived, nationally important pink sea-fan Eunicella verrucosa also occur at this site. The reef feature is in full salinity and subject to strong coastal influence.
Fal and Helford SAC	The hard bedrock reefs at this site are of low to medium topographic complexity and exist as patches of sublittoral rock (an uncommon habitat within marine inlets). They are subject to strong coastal influence, with parts of the reef experiencing reduced/variable salinity. The energy levels at this site are moderate. Within the marine inlets, deep sheltered bedrock reef is dominated by sponge and seasquirt communities. On the exposed open coast, dense kelp forests occur in shallower water, along with aggregations of jewel anemones, and Devonshire cup corals. In some deeper locations, pink sea fans occur. The maximum depth of reef systems in the Fal and Helford is around 30m bcd.

Haig Fras has been submitted to, and approved by, the European Commission and is now a Site of Community Importance. It awaits designation by the UK Government as an SAC.

Site	Description of relevant qualifying features
Haig Fras cSAC	The site is an isolated, fully submarine bedrock outcrop located in the Celtic Sea, 95km north west of the Isles of Scilly. The rocky outcrop is approximately 45km long and in one area rises to a peak that lies just 38m beneath the sea surface. It is the only substantial area of rocky reef in the Celtic Sea beyond the coastal margin. The rock is granite, mostly smooth with occasional fissures. It supports a variety of fauna ranging from jewel anemones *Corynactis viridis* and Devonshire cup coral *Caryophyllia smithii* near the peak of the outcrop, to encrusting sponges, crinoids and Ross coral *Pentapora foliacea (now P. fascialis)* towards the base of the rock (where boulders surround its edge). The surrounding seabed is approximately 100m deep.

Natural England are proposing Lizard Point cSAC, Prawle to Plymouth Sound and Eddystone cSAC and Land's End to Cape Bank cSAC within the Western English Channel and Celtic Sea Regional Sea.

Site	Description of relevant qualifying features
Lizard Point cSAC	Lizard Point is a geologically and topographically complex area consisting of upstanding sublittoral reefs, flat bedrock reefs and rocky shoals, all skirted by a relatively flat basin. The reef is a moderate to high-energy system with the shallowest areas characterised by red algae and small amounts of kelp, the deeper tide swept slopes by anemones, soft corals, hydroids and echinoderms, and the scour tolerant communities at the slope bases. Lizard Point is fairly unique in terms of its underlying geology.
Land's End and Cape Bank cSAC	The Land's End and Cape Bank site lies to the west of the Land's End peninsula and extends to almost 25 km from the coast. The reefs are fully submarine, upstanding features which are composed of almost entirely of granite. The site has two main reef areas, the coastal margin reefs running along the coast and offshore upstanding reef which extends in a broad, arching crescent roughly aligned with the coastline. The inshore reefs are notable for their topographic complexity, which results in high biological and biotope diversity. The reef is dominated by tide-swept kelp forest and kelp parks with dense foliose red algae. The crescent shaped system of offshore upstanding rocky reefs forms the major feature of conservation interest at the site. The reef is characterised by high biodiversity tide-swept communities such as sponges, faunal and algal turfs and crustose communities.
Prawle Point to Plymouth Sound & Eddystone cSAC	The site comprises a mosaic of three areas containing Annex I 'reef' habitat. The reef habitats comprise complex outcropping bedrock, boulders and rocky gullies, fissures, crevices and pinnacles. They support a wide variety of reef fauna and flora commonly showing excellent examples of zonation from the infralittoral down to deeper water communities. The site is known to support some species rarely encountered in south-western waters such as the cushion star *Porania pulvillus*, the slipper lobster *Scyllarus arctus* and the sea fan anemone *Amphianthus dohrnii*. Furthermore, the presence of relatively large numbers of warm-water species, e.g. *Alcyonium glomeratum* and *Holothuria forskali*, in addition to more typical English Channel fauna indicates the area spans across a biogeographical boundary. The site also supports the most extensive and highest density beds of the sea fan *Eunicella verrucosa* and probably the most extensive and widespread colonies of the nationally rare sunset coral *Leptopsammia pruvoti*. The Eddystone Reefs area extends down into deep waters and supports good examples of deeper water reef species (such as the starfish *Porania pulvillus* and the parchment tube worm *Phyllochaetopterus anglicus*) that may not be so frequent on the more common inshore reefs.

5.3.2 Sea cave habitats

The only sea cave habitat within an existing SAC in the Western English Channel and Celtic Sea Regional Seas occur within the Lundy SAC (Defra, 2004). However they do not form a primary feature of the SAC and are listed as Grade C (Examples of the feature which are of at least national importance (i.e. usually above the threshold for SSSI/ASSI notification on terrestrial sites) but not significantly above this, also these features are not the primary reason for SACs being selected). No detailed account of the features are given.

Within the Eastern English Channel Regional Sea, sea caves are primary features within one SAC, the features of which are detailed below.

Table 5.2 Regional SACs comprising sea cave habitat

SAC	Description of relevant qualifying features
South Wight Maritime	The southern shore of the Isle of Wight, off the coast of southern England, includes a number of either submerged or partially submerged sea caves. The exposure of the south coast of the island to high wave energy has allowed the erosion of the Cretaceous calcareous hard cliffs to form sea caves. Examples of this habitat can be found from the Needles along the south-west coast of the Island, and also in Culver Cliff on the south-east coast of the Island. This site also contains the only known location of subtidal chalk caves in the UK. The large littoral caves in the chalk cliffs are of ecological importance, with many hosting rare algal species, which are restricted to this type of habitat. The fauna of these sea caves includes a range of mollusc species such as limpets *Patella* spp. and the horseshoe worm *Phoronis hippocrepia.*

6. Site boundary

The boundary around the Lyme Bay and Torbay site has been drawn using the guidance provided by JNCC, 2008 and was defined through GIS mapping with further consideration against the guidelines (see Appendix 1). The key parts of this guidance are that the site boundary should be defined as simply as possible with a minimum number of straight lines, and should include the minimum area necessary to ensure protection for the Annex I habitat of interest. More complex shapes drawn more tightly around feature of interest are favoured over simple square/rectangular boundaries, to reduce the area of 'non-interest-feature' included within the site boundary. Where it is justified to protect the features of the site from the effects of mobile gear on the seabed at some distance from a vessel on the surface, a margin in proportion to the water depth may be added to the extent of the feature when defining the site boundary.

7. Assessment of interest feature(s) against selection criteria

A full explanation of the application of the site selection criteria can be found on JNCC's website at www.jncc.gov.uk/page-4165.

7.1 Reefs

7.1.1 Representativity (a)

The evidence from survey data (Royal Haskoning, 2008) indicates that the reef features within the Mackerel Cove to Dartmouth area are indicative of Annex I reef habitat. They represent a broad range of the habitat, with examples of igneous, sandstone, mudstone and limestone reefs, as well as supporting biogenic reef features (in the form of *S.alveolata* beds). The information gathered on the ecology of these features shows that they support a wide variety of species that typify reef habitat (such as hydroids, algae, sponges and corals) and include a number of nationally important species (such as the pink sea fan *Eunicella verrucosa*).

The Lyme Bay Reefs area comprises rock, cobbles, pebbles and boulders all of which fall under the classification of Annex I reef habitat. The site is indicative of offshore reef, where sea squirts (such as *Ascidiella aspersa* and *Phallusia mammillata*), sponges (such as *Cliona celata*), anemones (such as *Aiptasia mutablilis* and *Urticina felina*), corals (such as *Alcyonium digitatum, Caryophillia smithii* and *Leptopsammia pruvoti*), sea fans (such as *Eunicella verrucosa*) and bryozoans (such as *Pentapora foliacea (now P. fascialis)*) dominate and sustain a wide diversity of other species. Furthermore, diver accounts indicate that the areas of exposed bedrock include mudstone, sandstone, limestone (which is commonly piddock bored) and igneous rock. These different rock types all create a range of different habitats which subsequently adds to the site's

diversity, and increases its representativity over a wider range of criteria. A recent study undertaken by Hiscock & Breckels (2007) has identified this area has having particularly high species richness and identified it as a marine biodiversity "hot spot".

The Lyme Bay and Torbay is graded A (excellent representativity)

7.1.2 Area of habitat (b)

An evaluation of relative surface area is approximate as no accurate total extent figure is available for Annex I reef habitat for UK waters. The closest approximation available for the entire resource (bedrock, cobble and biogenic reef) in UK waters is 7,180,000 hectares. This total extent figure gives the following thresholds for the grades of this criterion (Commission of the European Community, 1995):

A – extents between 1,077,000 and 7,180,000 ha (15-100% of total resource)
B – extents between 143,600 and 1,077,000 ha (2-15% of total resource)
C – extents less than 143,600 ha (0-2% of total resource)

The area of Annex I reef habitat enclosed by the site boundary is 14,289 hectares, which is 46% of the total site area. This value equates to less than 1% of the national extent.

This site contains less than 1% of the national Annex I reef resource and is therefore, graded C for the area of habitats criteria

7.1.3 Conservation of structure and function (c)

Degree of conservation of structure
The structure of the Annex I habitats found within the Mackerel Cove to Dartmouth area vary to some extent, with the majority of the reef habitats appearing to have a good structure and conforming to the Annex I habitat description. The reef around Hope's Nose especially where close to the main areas of human activity has reports of anthropogenic impacts (as detailed below). However, none of these impacts are considered significant enough to warrant concern regarding the feature's structure.

Within the Lyme Bay Reefs area fishing activity, namely scallop dredging, has been widely undertaken and concerns over the impacts of this activity on the important species inhabiting the reefs led to the statutory closure of the area in July 2008. (http://www.defra.gov.uk/marine/pdf/biodiversity/lyme-bay-closure.pdf).

Fishing activity has occurred extensively in this area up until July 2008 as a result of increases in the commercial value of scallops (Devon Wildlife Trust, *pers.comm*.). The effect of scallop dredging has resulted in the degradation of reef structure as well as biota. The effects are significant in terms of impacts on the ecology; as shown by the studies undertaken by Marine Bio-images where video footage exists before and after dredging activity. (http://pinkseafan.wildlifetrusts.org/threats.html). The physical structure of the majority of the reef habitat within this area is considered to be in relatively good condition. However, in areas where scallop dredging has coincided with softer bedrock and areas of boulder / pebble reef degradation to the structure has occurred.

The Lyme Bay and Torbay site is therefore, graded II (structure well conserved)

In accordance with the EU manual (EC, 2007), where anything below the highest ranking is given to the Structure, then an assessment should be made of the sites function.

Degree of conservation of functions
The function of the Annex I habitats outside of Torbay is considered to be good due to the general lack of anthropogenic threats. Impacts from the discharge of sewage around Hope's Nose have been reported.

The functioning of the reef habitat with the Lyme Bay Reefs area is dependent on a lack of disturbance and there is now plenty of evidence for the damaging effect of this fishery on the marine life over large parts of Lyme Bay (Seasearch, 2006). The key, indicative reef species are commonly delicate slow growing, species that rely on recruitment from the immediate surrounding waters. Therefore, any direct disturbance to an area may not only result in direct mortality but also impact on the success of the surrounding population.

The conservation effort until July 2008 had focused on the establishment of voluntary closed areas to mobile gear. These closures were non-statutory and believed to be insufficient in keeping all the dredging activity out of the closed areas. In addition, and as mentioned previously, the Annex I Habitat extends well beyond the small voluntary closed areas. However, following the establishment of statutory closed areas and introduction of conservation measures, the site should be able to restore its structure and function over time. The voluntary exclusion zones provided an example of this, where nine months after the agreement was signed, three of the five key species were up to 10 times more abundant in the protected zones compared with fished areas (Hiddink *et al*, 2007). Importantly the recovery of species included some of the key reef species such as *Alcyonium digitatum* and *Eunicella verrucosa*.

The Lyme Bay and Torbay site is therefore, graded II (good prospects)

As the site is not considered to have the lowest ranking for either 'Structure' or 'Function' there is no requirement to assess the 'Restoration Potential' of the site (in accordance with guidance set out in the EU manual (EC, 2007)).

Overall grade
The Lyme Bay and Torbay site has been graded II for the conservation of structure sub-criterion, and II for the conservation of function sub-criterion.

The overall grade for the conservation of structure and function criterion is grade B (good conservation).

7.1.4 Global assessment (d)

The Mackerel Cove and Dartmouth site is comprised of a wide range of different Annex I reef habitats and consequently the area supports a high level of biological diversity that is represented by the reef features that may not be found in areas of single rock type.

The reef habitat in the Lyme Bay Reefs area represents a significant proportion of the total regional area of reef habitat. Furthermore, the site comprises a number of different types of reef habitat. The reefs are nationally renowned for their dense floral and faunal assemblages, and are known to support significant populations of a number of nationally important species. Fishing activity has resulted in damage to the structure and functioning of many parts of the reef. However, statutory measures have recently been put into place to exclude scallop dredging and trawling from the reefs and evidence from studies of an area following fishing activity indicates that the site shows good recovery potential.

The Lyme Bay and Torbay site is graded A (excellent conservation value)

7.2 Sea Caves

7.2.1 Representativity (a)

The requirements for sea caves to be considered 'representative' of Annex I habitat are less detailed than for reefs.

The indicative features of sea caves as set out by the JNCC includes:

- Submerged sea caves and also partially submerged caves which are only exposed to the sea at high tide.
- Caves vary in size, and include tunnels or caverns with one or more entrances, in which vertical and overhanging rock faces provide the principal marine habitat.
- Caves are typically colonised by encrusting animal species but may also support shade-tolerant seaweeds near their entrances.
- Caves that are subject to strong wave surge are characterised by communities of mussels *Mytilus edulis*, barnacles *Balanus crenatus*, cushion sponges, encrusting bryozoans and colonial ascidians, depending on the degree of water movement and scour at particular points in the cave system.
- Caves that occur in deeper water are subject to less water movement from the surrounding sea, and silt may accumulate on the cave floor. The sponges, soft corals, solitary ascidians, bryozoans and sessile larvae of jellyfish are characteristic of deeper cave systems. These caves may also provide shelter for crabs, lobsters *Homarus gammarus*, crawfish *Palinurus elephas*, and fish such as leopard-spotted goby *Thorogobius ephippiatus*.

Whilst not all the sea caves in this area have been fully documented, Proctor (2009) describes the presence of many indicative species and physical characteristics as outlined above. Therefore, it is considered that sea caves between Sharkham Point and Mackerel Cove are representative according to the guidelines.

The Lyme Bay and Torbay site is graded A (good representativity)

7.2.2 Area of habitat (b)

Sea caves are found around the UK coastline. However, no comprehensive mapping of the features has been undertaken, and therefore it is difficult to draw any conclusion in terms of the relative surface area taken up by the caves both within the Area of Interest and on a UK wide scale. However, due to large numbers found in a relatively small area it is felt that the Torbay caves represent a well developed example of this feature.

Given the lack of national context, it is not possible at present to grade this feature.

7.2.3 Conservation of structure and function (c)

Degree of conservation of structure
The evidence available on the sea caves does not note any structural damage.

The Lyme Bay and Torbay site is therefore, graded I (excellent prospects)

Degree of conservation of functions
The evidence available on the sea caves does not note any damage, furthermore there is indication of some caves supporting self-sustaining communities which would indicate that the functioning of the features is in good condition (Proctor, 2009).

The Lyme Bay and Torbay site is therefore, graded I (excellent prospects)

Overall grade
Given the highest ranking for structure, no assessment of the restoration potential, is required in accordance with EU guidance (EC, 2007).

Therefore, the overall grade for the conservation of structure and function criterion is grade A (excellent conservation value).

7.2.4 Global assessment (d)

The sea caves are the least well understood feature of the Annex I habitat types present, in both a local and national context. It can be concluded that the site supports a large number of caves that can be considered representative of Annex I habitat. Some of these caves have been found to support a number of nationally important species.

The Lyme Bay and Torbay site is graded B (good conservation value)

NB. This feature has not been graded as A, as, whilst clearly representative, is not considered as significant as chalk caves (given the rarity of the latter feature).

7.3 Summary of scores for Stage 1A criteria

Lyme Bay and Torbay	Representativity (a)	Relative surface (b)	Structure and function (c)	Global assessment (d)
Reefs	**A**	**C**	**B**	**A**
Sea caves	**A**	**N/A**	**A**	**B**

8. Sites to which this site is related

None.

9. Supporting scientific documentation

Scientific information on the topography, habitats and species present within the Lyme Bay and Torbay candidate SAC boundary is available from a number of sources. These are listed in the table below:

Reference	Description
2002 - 2009 Seasearch survey	A regional marine monitoring programme.
2005 Devon Biological Records Centre Lyme Bay Substrate Map.	Substrate mapping exercise.
2005 Start Bay side scan sonar survey conducted by Ambios Ltd.	Detailed site survey to fully characterise areas where data gaps lie in the Lyme Bay mapping study.

Reference	Description
DBRC, 2005. Lyme Bay sampling programme.	Lyme Bay drop video and grab sampling were undertaken to produce a biotope map of the benthic habitats of Lyme Bay. Grab samples from 133 sites.
DBRC, (1977-1998). Devon Eunicella verrucosa records.	DBRC collated records for the Pink sea fan Eunicella verrucosa.
DWT, (2001-2006). Lyme Bay Reefs Monitoring work.	The dataset compiles information on the status of the Lyme Bay reefs from 2001 to 2004.
DERC, (1995 – 2004). Dorset Seasearch.	Seasearch diver survey programme for the period of 1995 to 2004.
Lyme Bay Environmental Study Volume 3. Subtidal benthic ecology: Epibenthos. Report for Kerr McGee Oil (UK) Plc. Cleator, (1995).	A report on the hard substratum communities in the eastern section of Lyme Bay (Lyme Regis to Portland Bill).
Lyme Bay Environmental Study ROV Video Survey (Appendix 2 Volume 3). Report for Kerr McGee Oil (UK) Plc. Munro 1995.	An ecological report from ROV survey for Oil and Gas exploration. 29 ROV sampling stations.
Proctor (2009) sea cave study.	A study to record and describe the sea cave habitats within Torbay.
2003 Reef Research. Climate change impacts on sea fan populations. Munro, 2003.	A study into the effects of climate change on sea fan populations.
2003 Reef Research. East Tennants reef sea fan study. Interim report. Munro, 2003.	A status report on the sea fans within The East Tennants Reef.
Davies J, 1998. Western Channel (Durlstone Head to Cape Cornwall, including the Isles of Scilly) (MNCR Sector 8).	Provides a summary of Dorset Underwater Survey carried out in the 1970's and 1987-present Devon MNCR surveys.

10. Site overview and conservation interest

10.1 Reefs

The Lyme Bay Reefs area is one of the most heavily surveyed and studied areas on the south coast of England. The seabed in this area is found to comprise a wide variety of reef features including:

- outcropping bedrock (including igneous, chalk, mudstone and limestone)
- Pebbles, cobbles and boulders.

These reef areas are interspersed with patches of gravel & coarse sands (commonly supporting maerl) and sands & muddy sediments. Given the high sediment complexity, a diverse range of seabed habitats occur in the area; with over nine biotopes having been recorded from MNCR diver records alone (MNCR, 2009). Studies carried out in the area have mapped the biotopes across the area, and biotopes found are described in the table below:

Biotope Code	Biotope description
CR.HCR.Xfa and SS.SMx.CMx	Mosaic of mixed faunal turf communities and sublittoral mixed sediment
CR.HCR.Xfa.ByErSp.Eun	*Eunicella verrucosa* and *Pentapora foliacea* on wave-exposed circalittoral rock
CR.HCR.Xfa	Mixed faunal turf communities
CR.FCR.Cv.SpCp	Sponges, cup corals and anthozoans on shaded or overhanging circalittoral rock
SS.SCS.CCS	Circalittoral coarse sediment
SS.SCS.CCS.MedLumVen	Venerid bivalves in circalittoral coarse sand
SS.SCS.CCS.PomB	Cobbles and pebbles covered with keel worms and barnacles
SS.SCS.CCS.Blan	*Branchiostoma* in coarse sediment
SS.SMx.CMx.ClloMx	Burrowing anemones in muddy mixed sediment
SS.SMx.CMx.OphMx	Brittlestar beds
SS.SSa and SS.SMu.CSaMu	Mosaic of sublittoral sands and muddy sands
SS.SSa.CMuSa.AalbNuc	Bivalves in muddy mixed sediment
SS.SSa	Sublittoral fine sand or mud

The Mackerel Cove and Dartmouth area comprises a number of discrete features of interest. The reefs between Dartmouth and Scabbacombe Head are thought to represent slate reef with occasional granite outcrop. The slate reefs represent complex topographic features characterised by steeply inclined bedrock rising vertically with deep gullies. The reefs have extensive algal coverage of both kelp and red algae and within the littoral and infralittoral zones support large numbers of the mussel *Mytilus edulis* (Plate 3). Faunal communities are noted for their richness (especially in areas where the rock strata drops vertically off). These deeper rock and tide swept ridges have recorded abundant assemblages of hydroids, particularly *Nemertesia* spp and other species such as the sponge *Cliona celata* and anemone *Actinothoe sphyrodeta*, soft corals and crustacea. The sandy sediments between the rock outcrops have also been noted for their unusually high species richness for such substrates. A number of records of important species (i.e., BAP & protected species) such as *Eunicella verrucosa* exist on these reefs.

The reefs present between Crabrock Point and Sharkham Point are formed from mud ledges which form 2m high rock ridges. These are heavily silted and colonised with much sessile flora and fauna such as *Laminaria* spp, and anemones (such as *Metridium senile*).

The reefs surrounding Berry Head principally comprise limestone ridges, boulders and pinnacles. The complex reef features, including ridges, vertical drop-offs, pinnacles and deep gullies, support rich species assemblages, with dense kelp, red algae recorded along with many records of other sessile fauna such as hydroids, anemones and cnidarians.

The reefs within Torbay comprise discrete areas associated with the many headlands and coves (and include from south to north; Brixham to Ivy Cove reefs, Torbay ridges, Churston Point, Armchair Rock, Roundham Head and Hollicombe rocks to Livermead sands). The reefs in Torbay have a more diverse composition with limestone outcrops recorded in the southern half of the bay, and sandstone in the upper half of the bay. All the reefs support rich species assemblages, with piddocks adding to the habitat complexity in the limestone outcrops in the south, and vertical faces and deep fissures in the sandstone providing a diverse range of habitats in the northern reefs. The reefs also support mussel (*Mytilus edulis*) beds and honeycomb worm (*Sabellaria alveolata*) reefs

(Torbay Council, 2004) although there is poor information available on the extent and status of these.

Hope's Nose reef (including Thatcher Rock and the Ore Stone) is a large area of limestone reef extending around the northern headland of Torbay. Accounts of the reef indicate that it is stepped, with abundant sessile species (such as algae, anthozoa and hydroids) present. Off the Ore Stone a mat of mussels and carpet anemones dominates the seabed, which is also known to support the locally rare sea slug *Okenia elegans*. The seabed at Hope's Nose itself (to the north of the headland) has been surveyed as part of the MNCR surveys that described the presence of an impoverished faunal and floral community as a result of localised pollution from a sewer outfall. However, this was in 1977 and in the intertidal zone, therefore may not be representative of the offshore reef nor its current status.

The pink sea fan *Eunicella verrucosa* is found throughout the site, with key assemblages occurring within the Lyme Bay Reefs area where densities are notably high. The fan is a species of soft coral which occurs on rocky reefs on the Southwest and on the western seaboard of Ireland, and whilst it is not a key feature of the Annex I habitat, it is statutorily protected at a national level under the Wildlife and Countryside Act 1981. It is also considered a priority species under the UK Biodiversity Action Plan (http://www.ukbap.org.uk/UKPlans.aspx?ID=292) and is described as 'vulnerable' on the EU Red list category. Other important species include the nationally rare sponge *Adreus fascicularis* and the nationally rare sunset cup coral *Leptopsammia pruvoti* have been recorded, as well as the sponges *Axinella dissimilis* and *Axinella ddamicormis*.

10.2 Sea Caves

A large number of sea caves have been identified within Torbay and the surrounding coastline but only caves that have an infralittoral (below mean low water; MLW) element are considered here. Infralittoral sea caves are found throughout the Area of Interest from Mackerel Cove in the north, to Sharkham Point in the south (Section 4). Many of these caves are large and complex, and contain rich marine (and sometimes also terrestrial) faunas. Of particular importance is the high diversity of these caves. Of the classical wave-eroded sea caves, there are examples at all the sites listed above (Proctor, 2009). They occur in several different rock types, and at levels from above the high water mark of spring tides down to permanently flooded caves lying in the infralittoral zone. Many of the caves have a rich fauna, which varies considerably between caves (as is to be expected given the high diversity of the sites), however, most sites have not yet been comprehensively surveyed and this needs to be completed before their significance can be properly assessed (Proctor, 2009).

Despite the limited survey effort on these caves a number of nationally significant species have been found within these caves as detailed in **Table 10.1**.

Table 10.1 Nationally significant species in sea caves (Source: Seasearch, 2006).

Species	Common name	National importance
Thymosia guernei	Sponge	Rare
Alcyonium hibernicum	Pink sea fingers	Scarce
Edwardsia sp	Burrowing anemones	Occasional/rare
Caryophyllia inornata	Southern cup coral	Rare
Hoplangia durotrix	Weymouth carpet coral	Rare
Galathea nexa	Squat lobster	Rare (S Britain)

11. Photographic plates

Plate 1 Ross coral, erect sponges and a hydroid/bryozoan truf with some red algae Source: Devon Wildlife Trust

Plate 2 *Dictyota dichotoma* & red seaweeds Source: Dorset Wildlife Trust, 2004

Plate 3 Mussel beds off Dartmouth (© Keith Hiscock)

12. References

BROWN A E, BURN A J, HOPKINS J J & WAY S F (eds), 1997. The Habitats Directive: selection of Special Areas of Conservation in the UK. Joint Nature Conservation Committee Report 270, Peterborough, 295pp.

CEC, 1995. *Natura 2000 Standard Data Form: Explanatory Notes.* Brussels: European Commission DG Environment. 32pp.

DAVIES J, 1998. Western Channel (Durlstone Head to Cape Cornwall, including the Isles of Scilly) (MNCR Sector 8). In: *Marine Nature Conservation Review. Benthic Marine Ecosystems of Great Britain and the north-east Atlantic,* ed. by K. Hiscock, 219-253. Peterborough, Joint Nature Conservation Committee.

DEFRA, 2004. Review of Marine Nature Conservation. Working Group Report to Government [online]. London: Defra. Available from: http://www.defra.gov.uk/marine/pdf/biodiversity/rmnc-report-0704.pdf [Accessed March 2007].

DORSET WILDLIFE TRUST, 2004. Seasearch survey Report 1995 – 2004.

EC, 2007. Interpretation manual of European Union habitats. Version EUR 27. European Commission (DG Environment), Brussels.

EU, 2003. The EU Interpretation Manual of European Union Habitats. European Union October 200.

HIDDINK J, KAISER M, HINZ H & RIDGEWAY A, 2007. Quantification of epibenthic fauna in areas subjected to different regimes of scallop dredging activity in Lyme Bay, Devon. School of Ocean Sciences, College of Natural Sciences, Bangor University.

HISCOCK K, BRECKELS M, 2007. Marine Biodiversity Hotspots in the UK. A report identifying and protecting areas for marine biodiversity. WWF 2007.

JNCC, 2008. UK guidance on defining boundaries for marine SACs for Annex I habitat sites fully detached from the coast.

MCLEOD C R, YEO M, BROWN A E, BURN A J, HOPKINS J J & WAY S F (eds), 2005. The Habitats Directive: selection of Special Areas of Conservation in the UK. 2nd edn. Joint Nature Conservation Committee, Peterborough.

MNCR, 2009. 1987 - 2009 Devon MNCR surveys

PROCTOR C J, 2009. The Coastal Caves of Torbay. Report to Torbay Coast and Countryside Trust and Natural England. Volumes I and II.

ROYAL HASKONING, 2008. Identification of Annex I Habitat suitable for SAC designation within the Lyme Bay and Torbay area.

SEASEARCH, 2006. Berry Head Survey 2005 – 2006.

SERAD, 2001. A fishing industry guide to offshore operators. Scottish Executive, Edinburgh, 28.

TORBAY COUNCIL, 2004. Tor Bay Marine Biodiversity Action Plan

13. Glossary

Abiotic Devoid of life

Acoustic survey A survey undertaken using remote methods to establish the topography and or seabed texture.

Amphipods are shrimp-like crustaceans ranging from 1 mm to 140 mm in length Marine amphipods may be pelagic (living in the water column) or benthic (living on the seabed). Pelagic amphipods are eaten by seabirds, fish, and marine mammals.

Anthropogenic Human-induced or resulting from human activities.

Ascidian An ascidian or sea-squirt is a marine animal which lives attached to rocks.

Banner Banks are generally only a few kilometres in length with an elongated pear-shaped form (Dyer and Huntley, 1999). They commonly lie in the lee of fixed obstacles such as headlands, islands, submerged rock shoals and gaps in rock ridges. They are sometimes paired on either side of the obstacle, with one larger than the other indicating a net direction of sand transport (Stride, 1982). Banner banks may also occur in areas with rapid deepening of water away from the coast and are less evident off coasts with a low offshore slope (Dyer and Huntley, 1999). Examples occur in the English Channel, Irish Sea and North Sea.

Bathyal Relating to or living in ocean depths between 200 and 2,000m.

Bedforms Ripples moulded by a flow of water. Bedforms range in size from ripples in the sand, a few centimetres apart, to 'dunes' tens of metres in length.

Benthos Those organisms attached to, or living on, in or near the seabed.

Biodiversity The full range of natural variety and variability within and among living organisms.

Biogenic concretion Feature defined as: concretions, encrustations, corallogenic concretions and bivalve mussel beds originating from dead or living animals, i.e. biogenic hard bottoms which supply habitats for epibiotic species.

Biogeographical boundary A geographical boundary based on biological features.

Biomass The weight of living matter, usually given as weight per unit area.

Biotic Relating to, produced by, or caused by living organisms.

Biotope The physical habitat with its biological community; a term which refers to the combination of physical environment and its distinctive assemblage of conspicuous species.

Bivalves A class of molluscs which are laterally flattened and have a shell made of two hinged valves.

Brittle star bed A dense aggregation (or bed) of brittle stars also called Ophiuroid.

Bryozoans are tiny colonial animals that generally build stony skeletons of calcium carbonate, superficially similar to coral (although some species lack any calcification in the colony and instead have a mucilaginous structure).

Circalittoral The region dominated by sessile animals, found below the algal zone.

Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) Also known as 'the Habitats Regulations'. This transposes the Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (EC Habitats Directive) into national law.

Coral An invertebrate that secretes an internal, hard skeleton structure composed of calcium carbonate, which is absorbed from the surrounding water.

Corallogenic Reef building organisms with calcareous structures.

Crinoids A class of echinoderms having a cup-shaped body with feathery arms, attached to the substratum, sometimes by a stalk.

Crustacea A group of animals with two pairs of antennae and a calcium carbonate exoskeleton e.g. crab or lobster.

Crustose Forming a thin crust on the substratum.

Deadman's fingers A colonial soft coral that forms thick, fleshy and irregular masses, which are often finger-like in appearance.

Demersal Organism living on or close to the sea bed.

Echinoderm Any member of the phylum Echinodermata, a group of exclusively marine invertebrate animals including sea urchins, star fish and brittle stars.

Environmental Statement The formal document produced following the undertaking of an environmental impact assessment, in order to acquire consent for an activity.

Epifauna A term to describe animals living on the surface of the seabed.

Estuary mouth Dyer and Huntley, 1999: "…in general linear sand ridges are associated with the mouths of macro-tidal estuaries (wide mouth), and tidal deltas are associated with meso-tidal or micro-tidal estuaries (narrow mouth)." The banks are generally "aligned with the tidal current flow and migrate away from their steeper face." Examples include Long Sand and Gunfleet Sand (in the Thames Estuary) and banks in The Wash.

Foliose Bearing leaves or leaf-like structures.

Fauna Animal life in an area.

Geogenic origin A feature formed by non biogenic substrata.

GIS Geographic Information System

Grab sample A method of physical surveying to assess the seabed constituents. Sample is collected in a 'bucket' and the contents then analysed for biological / physical purposes.

Habitat The place in which a plant or animal lives.

Hard compact substrata Consolidated seabed sediment comprising rocks (including soft rock, e.g. chalk), boulders and cobbles (generally >64 mm in diameter).

Headland associated sandbanks Dyer and Huntley, 1999: "Tidal eddies produced by headlands can create 'banner banks, but when the headland is retreating 'alternating ridges' can be formed which can become isolated from the coast as it recedes." "With very slow retreat the surplus sand

will accumulate as a banner bank in a position of convergence. With coastline retreat, a series of alternating banks will result with each successive one more distant from the shoreline." Banner banks are only a few km in size and have an elongated pear-shaped form with the broad end being orientated towards the tip of the headland. Alternating ridges may be linear or V or S shaped.

Hydroids Solitary and colonial animals with a cylindrical; body which is closed at one end with a mouth surrounded by tentacles at the other.

Infauna A term to describe animals living within the seabed.

Linear Sandbanks are elongated banks which can be up to tens of kilometres long and less than ten kilometres wide. They lie generally parallel or at a slight angle to peak tidal currents. They can be found in open seas but are also common in large estuaries such as the Thames Estuary.

Littoral The intertidal zone.

Long lining A commercial fishing technique that uses hundreds or even thousands of baited hooks hanging from a single line.

Maerl Twig-like unattached (free living) calcareous red algae, often a mixture of species and including species which form a spiky cover on loose small stones.

Maintenance dredging Required to maintain water depths in areas where sedimentation occurs, particularly shipping channels to maintain a safe depth for the passage of vessels. It involves the removal of recent unconsolidated sediments, such as mud, sand and gravel.

Mollusc A phylum of invertebrates which include modern creatures such as snails, slugs, cockles, and squids.

Multibeam A marine survey technique to establish the bathymetry and identify sea bed features.

Nemerteans A phylum of invertebrate animals also known as *ribbon worms* or *proboscis worms*.

Open shelf ridge Dyer and Huntley, 1999: 'Nearly all shallow tidal seas, where currents exceed about 05 m s-1 and where sand is present, have ridges. These can be up to 80km long, and typically average 13km width and tens of metres in height. Their spacing tends to be proportional to their width. The bank crests are flat in shallow water, but are sharp when water depth is large enough to limit wave effects.' Examples include South Falls and Indefatigables.

Ophiuroid Commonly known as brittle stars. Ophiuroids are a variety of marine organisms of the class Ophiuroidea, related to and resembling the starfish but having long slender arms.

Piddock Type of rock boring mollusc.

Piddock bored A rock that has been bored into by a type of mollusc.

Pink sea fan The term used to describe a particular colony of cnidarians (coral). Pink sea fans are formed from a colony of tiny polyps; they may be a deep pink to white in colour, and attach to the substrate with a broad base.

Polychaete Marine worms of the class Polychaeta of the invertebrate worm order Annelida.

Potting The setting of traps (pots) on the seabed to fish for lobsters, crabs etc.

Pterobranchs Small marine filter feeders in the phylum Hemichordata.

Sand wave A large, ridge-like structure resembling a water wave on the upper surface of a sedimentary bed that is formed by water currents. Also known as sand ridge.

Sandy mounds Distinct sandbanks (i.e. elongated, rounded or irregular 'mound' shapes) which cannot be categorised as any of the other types.

Seagrass(es) Higher plants (angiosperms) that are adapted to living submerged in seawater.

Sessile Permanently attached or fixed; not free-moving.

Shoaling Localized shallowing of water

Side-scan sonar A geophysical instrument that uses sound waves reflected off the seafloor to image the aerial extent of different bottom types.

Sinuous Banks are 'S' or 'V' shaped sandbanks and are common off the Norfolk coast and in the southern North Sea. They are large scale features and may occur in extensive groups which can include linear banks.

Sinusoidal having a succession of waves or curves

Sponge A variety of marine invertebrates, mostly of the phylum Porifera that have a porous skeleton often of silica.

Static gear Any gear which is set in position and not moved during the fishing process. Examples include:

- Gill nets which are set at or below the surface, on the seabed, or at any depth in-between.
- Setting pots on the seabed to capture lobsters and crabs.
- Long lining when a single line is set to capture cod, skate, bass and whiting.

Sublittoral The marine zone below Mean Low Water (MLW) springs.

Submarine cables Cables which are laid beneath the seabed to carry telecommunications or power to offshore installations or different countries.

Trawl scars Evidence of damage to the seabed from trawling (mobile fishing) activity.

Trawling Towing equipment behind a vessel for commercial fishing principally for cod, plaice and sole. Bottom trawls collect demersal (living on or near the seabed) species and mid-water trawls collect pelagic (living in the water column) species. Examples of towed gears include beam trawls, dredges and trawl nets.

Tunicate A primitive marine animal having a saclike unsegmented body and a urochord that is conspicuous in the larva.

Turbidity This is a measure of the attenuation of light in the water column and can be caused by the light adsorption properties of the water, plankton, suspended particulate organic matter and dissolved colour.

Turf A term used to describe a layer marine organism growing on a hard substrate.

Zonation The division of a large area into smaller areas based on certain predetermined characteristics.

Appendix 1

Guidelines on drawing boundaries (taken from JNCC, 2008)

1 Introduction

Previous UK guidance on defining SAC boundaries states that "as a general principle, site boundaries have been drawn closely around the qualifying habitat types … for which the sites have been selected, taking into account the need to ensure that the site operates as a functional whole for the conservation of the habitat type… and to maintain sensible management units". Further "the seaward boundaries of the sites have been drawn as straight lines, to ensure ease of identification on charts and at sea" (Brown *et al*, 1997; McLeod *et a*l, 2005). The guidance presented below is an expansion of previous guidance on defining boundaries for marine SACs, specifically for sites which are not connected to the coastline, and which may be in deep water (200m to more than 1000m).

2 Guidance

Actual site boundaries will be determined on a site specific basis, following the general guidance set out below.

2.1. The habitat area of interest will be identified and mapped. In many cases in waters away from the coast, this will involve some form of modelling, such as use of seabed geological data (interpolated from seismic tracks and samples), interpreted sidescan sonar, acoustic and/or bathymetric data.

2.2 The minimum area necessary in order to ensure the essential level of protection for the Annex I habitat of interest will be defined. More complex site shapes drawn more tightly around feature of interest are favoured over simple square/rectangular boundaries (to reduce the area of 'non-interest-feature' included within the site boundary). However, boundaries should still be as simple as possible, using a minimum number of straight lines and vertices. Contrary to previous JNCC boundary guidance (JNCC, 2004) site boundary co-ordinates do not have to be defined by whole degrees and minutes. It is recommended that site boundary coordinates will be provided in degrees, minutes, seconds.

2.3 Where habitat of interest occurs in a number of separate 'pieces' with 'non-interest-feature' habitat between, the preference is to include all 'pieces' within a site boundary to enable effective conservation of the feature of the site and to maintain its ecological function. However, where small, isolated instances of habitat occur at some distance from the main location of the habitat, these may be excluded from the site if their inclusion would result in large areas of 'non-interest-feature' being included within the site boundary.

2.4 The area defined under 2 above may then be extended if necessary in the following circumstances:

i). to ensure an essential level of protection from potentially damaging activities at the site, taking into account water depth at the site and possible location of mobile gear on the seabed in relation to location of a vessel at the sea surface. Activities which are location specific, always subject to prior consent and have clear reliable methods of enforcement are already controlled under existing procedures such as licensing of these activities. Mobile activities which may affect seabed habitats, such as fishing and anchoring, are not subject to prior consent procedures and therefore need special consideration. The length of warp used by

boats when trawling is largely determined by water depth. The following table gives the appropriate distance beyond the seabed extent of the habitat by which the site boundary at the sea surface may be extended (based on generalised trawl warp lengths, SERAD, 2001):

Water Depth	Ratio warp length: depth	Approx. length of trawl warp	Boundary extension to be added to the habitat area of interest
Shallow waters (≤ 25m)	4:1	100m at 25m depth	4 * actual depth
Continental shelf (50-200m)	3:1	600m at 200m depth	3 * actual depth
Deep waters (200 to over 1000m)	2:1	2000m at 1000m depth	2 * actual depth

Note that the margin is incorporated as a minimum measure to reduce the likelihood of habitat damage from demersal fishing. However, these boundaries are SAC boundaries, not management boundaries. Ultimately Competent Authorities are responsible for considering which management actions might need to be taken under the Offshore Marine Conservation (Natural Habitats, &c.) Regulations to reduce the risk of damage to the features associated with human activities, whether within or outside the site boundary. As a consequence, future management measure may have different boundaries to the SAC site boundary.

ii). For mobile habitats (for example, sandbanks), to ensure the minimum area necessary to allow conservation of the structure and functions of the habitat. Such extension will be determined on scientific understanding of the structure and functions of the habitat