

**Inshore Special Area of Conservation:  
Red Bay, County Antrim  
SAC Selection Assessment**



Cover photos show video frame grab of maerl mega-ripple and close up of a maerl thalli entangled by a rare alga, *Gelidiella calcicola*.

# 1. Introduction

This document provides detailed information about the Red Bay, County Antrim site and evaluates its interest features according to the Habitats Directive (Council Directive 92/43/EEC of 21 May 1992) selection criteria and guiding principles (Aish *et al.* 2008).

The advice contained within this document is produced to fulfil requirements of the Department of the Environment (Northern Ireland) under The Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995, SR 1995 No. 380, relating to the conservation of natural habitat types and species through the identification of Special Areas of Conservation (SAC) in NI territorial waters. Under these Regulations the Department is required to provide certain advice to Defra to enable the Secretary of State to fulfil his obligations under Regulation 28(2) of 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. Sites 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 following the European Court of Justice 'First Corporate Shipping' judgement C-371/98 (7 November 2000).

In addition to information on Annex I habitats, this document contains;

1. a chart of the site
2. its name, location and extent
3. the data resulting from application of the criteria specified in Annex III (Stage 1) to the Habitats Directive

The Department 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.

## Document Version Control

<i>Version &amp; Issue Date</i>	<i>Amendments made</i>	<i>Issued to and date</i>
<b><i>Red Bay Selection Assessment v 1 15 July 2009</i></b>	Initial draft prepared by J Breen, based on JNCC Offshore SAC template	Hugh Edwards & Stephanie Bennett, Gary Burrows, 16 July 2009
<b><i>Red Bay Selection Assessment v 2</i></b>	Production of Boundary map, centroid position, area & amendments to section 10.3	Howard Platt
<b><i>Red Bay Selection Assessment v 3</i></b>	Final Proof Reading	J Breen
<b><i>Red Bay Selection Assessment v 4.pdf</i></b>	Production of pdf version, publication on NIEA website	
<b><i>Red Bay Selection Assessment v 5.</i></b>	Minor amendments made in response to further comments from JNCC.	
<b><i>Red Bay Selection Assessment v 6.</i></b>	Minor amendments made in response to consultation comments.	22 February 2010

## Further Information

This document is available as a pdf file on NIEA's website for download if required.

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## 2. Red Bay, County Antrim: SAC Selection Assessment

<b>1. Site Name</b> Red Bay, County Antrim	<b>2. Site centre location</b> 55° 06.87'N, 006 ° 01.42'W (Datum:WGS 1984)
<b>3. Site surface area</b> 965.54ha/9.65km <sup>2</sup>	<b>4. Biogeographic region</b> Atlantic

## 3. Interest Feature(s) under the EU Habitats Directive

Definition of habitat 1110 *Sandbanks which are slightly covered by seawater all the time* (EU, 2007a)

### Definition

Sandbanks are elevated, elongated, rounded or irregular topographic features, permanently submerged and predominantly surrounded by deeper water. They consist mainly of sandy sediments, but larger grain sizes, including boulders and cobbles, or smaller grain sizes including mud may also be present on a sandbank. Banks where sandy sediments occur in a layer over hard substrates are classified as a sandbank if the associated biota are dependent on the sand rather than on the underlying hard substrata.

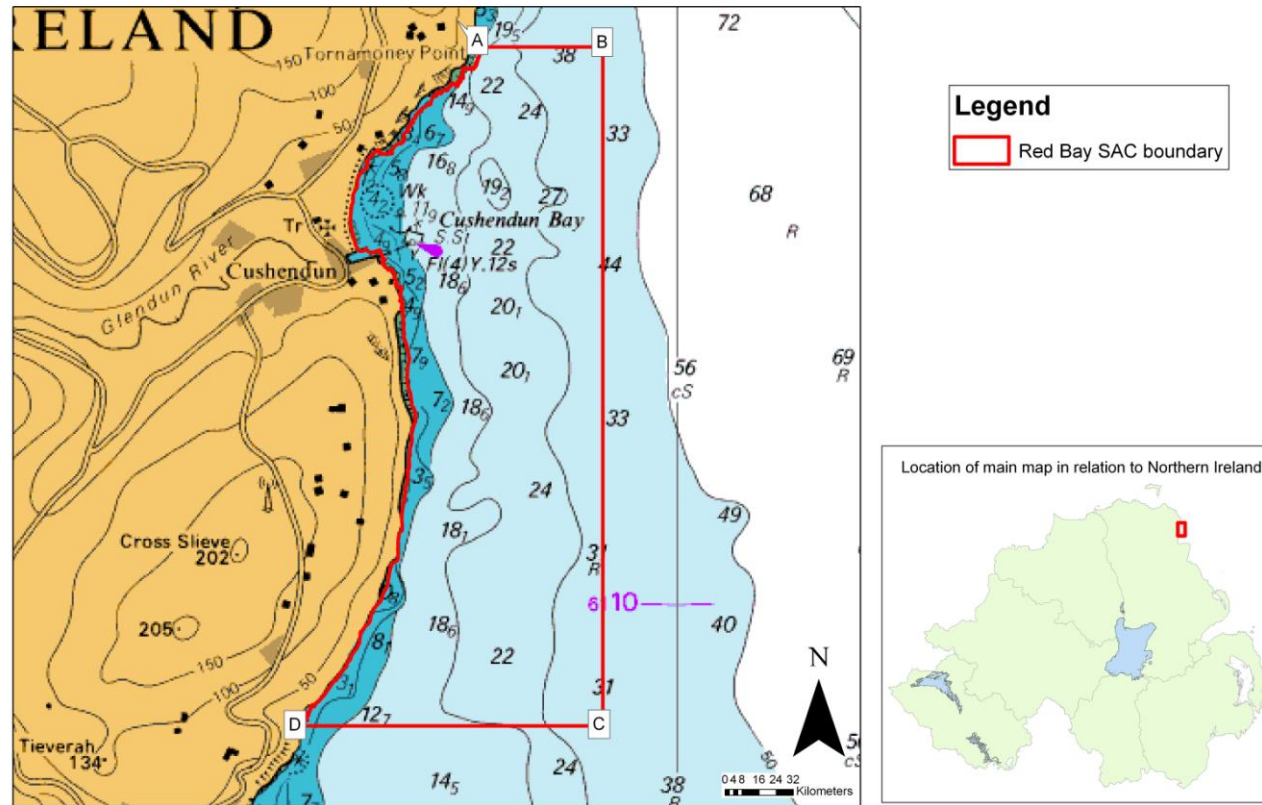
‘Slightly covered by seawater all of the time’ means that above a sandbank the water is seldom more than 20m below chart datum. Sandbanks can, however extend beneath 20m below chart datum. It can, therefore be appropriate to include in designations such areas where they are part of the feature and host its biological features.

Guidance provided by the Joint Nature Conservation Committee (JNCC) and Aish *et al* (2008) summarises JNCC’s interpretation of the EU definition at the UK level.

Under this definition, representative sandbanks:

- ❖ are mounds of variable topography rising from horizontal or sloping plains of sandy sediments (and these plains may be included within the Annex I type)
- ❖ have summits in waters <20m below Chart Datum (but may have flanks or channels in deeper waters, provided that these features are essential for the maintenance of structure and function of sandbank features)
- ❖ may be classed as ‘sandy mound’, or ‘tidal current’ sandbanks (see below)
- ❖ may have strong or intermediate coastal influence (where strong coastal influence relates to terrestrial inputs being a strong ecological driver for the system, and is usually associated with sandbanks associated in more inshore waters).
- ❖ Have no lower size limit, provided that the sandbank is large enough to maintain its structure and function
- ❖ Are composed of ‘sand’ (particle size in the range of 0.0625 – 2 mm), comprising ‘sand’, ‘muddy sand’, ‘gravelly sand’ or ‘sandy gravel’ within the Folk Classification Triangle (Folk, 1954).
- ❖ May be unvegetated, or vegetated with maerl, seagrass or seaweed; and
- ❖ May be in full salinity water or reduced/low/variable salinity water

## Inshore Special Area of Conservation Site Map: Red Bay, County Antrim



Boundary coordinates:

A) 55°08.44, 06°01.556 B) 55°08.44, 006°0.58 C) 55°05.45, 006°0.58 D) 55°05.45, 006°02.88

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*proposed boundary for Red Bay, Co Antrim inshore Special Area of Conservation*

*Figure 3.1. Site map indicating*

## 4. Site summary

Red Bay SAC is sited within the northern part of Red Bay. Red Bay is the largest embayment of the east Antrim coastline outside Larne Lough, and measures approximately 9.5km across the mouth of the bay as measured from Garron Point in the south to Tornamoney Point north of Cushendun village. The bay is open to the east and sheltered from westerly winds by the Antrim Coast and Glens Area of Outstanding Natural Beauty.

The bay is predominantly a marine site although there are significant influxes of freshwater which enter the sea via a number of rivers that flow directly into Red Bay as well as to the waters north and south of the bay itself.

The Red Bay site is located off the County Antrim village of Cushendun, Northern Ireland. It contains Annex I *Sandbanks slightly covered by seawater at all times* which are composed of maerl, sub-fossil maerl, coarse sands, gravels and cobbles. The sand bank is comprised of relic drowned drumlins from the last ice-age ca 15000 yr BP. The Red Bay sandbanks are dominated by both living maerl and sub-fossil maerl and have been thoroughly mapped and characterised as part of this SAC selection assessment. Unique to this site is the presence of large 2-3m high mega-ripples of sub-fossil maerl. These mega-ripples are comprised of maerl, gravel and sands on the crests, and cobbles and globular sub-fossil maerl in the troughs, with occasional sand patches on the slopes.

The beds were first recorded as part of the Northern Ireland Sub-littoral Survey (Erwin *et al*, 1986) although a hint of their true extent and conservation value was only discovered following a sewage outfall pre-discharge survey conducted by the Industrial Research & Technology Unit (IRTU) in 1999. Following on from this study and further studies by the various Government Agencies and a Queens University Belfast PhD by Sam Vize (Vize, 2005) on the distribution and biodiversity of maerl beds in Northern Ireland, the Department decided to propose Red Bay as a SAC for the feature sandbank, sub-feature maerl. As part of this process NIEA (formerly Environment & Heritage Service) commissioned mapping and seabed video surveys focussing on two sites off Cushendun and Garron Point (MERC, 2007). Queens University Belfast Centre for Biodiversity & Conservation Research (QUERCUS) was subsequently commissioned to review this new data and all other existing datasets to assess if either site warranted designation against agreed selection criteria.

The QUERCUS report (QUERCUS, 2008) forms the basis for selection of Red Bay, County Antrim as a Special Area of Conservation. Comparisons were made against other sites along the east Antrim Coast and nationally against sites in Scotland, Wales and the Republic of Ireland. While the Garron Point and Ballygalley Head sites to the south had a similar infaunal species composition to Red Bay, the presence at the Red Bay site of extremely rare algal species endemic to maerl (*Cruoria cruoriaeformis* (the second record in Northern Ireland), *Halymenia latifolia* (the first record for Northern Ireland) and *Gelidiella calcicola* (most northerly record of this southern Lusitanian species), combined with the presence of large mega-ripples of sub-fossil maerl overlying flat topped drowned drumlins, fully warrants Red Bay's selection as an SAC.

The nearest marine SAC to this site is Rathlin Island SAC (which comprises reef, sea cave and sandbank features) and is situated 15km to the north of Red Bay. However,

although small amounts of maerl have been recorded within Rathlin SAC, the quality and quantity is insignificant in comparison with Red Bay.

SAC	Notable characteristics of Sandbank feature
Rathlin Island	This feature consists of soft sediment habitats ranging from gravel, sandy gravels, fine sands and muddy sands. The dominant communities are <i>Amphiura</i> -dominated, fine sands, seagrass ( <i>Zostera</i> ) beds and historically, small patchy veneers of maerl (NIEA, 2008)

Strangford Lough SAC, 60km to the south, also contains several identified maerl beds which are part of the lough's shallow inlet and bay feature. The Strangford sites are biologically and physically distinct from the Red Bay maerl bed.

Murlough SAC is 100km to the south of Red Bay and does not have maerl associated with its sandbank feature interest.

SAC	Notable characteristics of Sandbank feature
Murlough	10000 ha of submerged sandbanks adjacent to 93ha of Atlantic decalcified fixed dunes (terrestrial)

The bathymetry of Red Bay varies from shallow sub-tidal areas along the shore to greater than 60m at the outer limit of the bay. A substantial area of the seabed is in the range of 5-20m below chart datum, sloping at a relatively stable gradient generally from west to east as far as the 30m contour. Beyond the 30m contour the gradient of the slope becomes somewhat steeper. The 50m contour occurs approximately 4 km from the shore.

The interesting underlying geology and its proximity to the strong North Channel currents, resulting in a complex system of tidal currents such as a 9 hour ebb tide instead of the usual 6 hours, is probably a contributory factor to the unique biological assemblage found at this site. It also makes it an extremely complex and challenging site to monitor. The contractors responsible for the baseline video survey noted that:

*'There are periods of slack water around low water, however, high water slack tide is unpredictable and may not occur on some days. Currents of up to 4 knots are common in the outer part of the bay during mid tide, and it is a feature of the area that the eddy currents form and then dissipate, apparently at will, during the tidal cycle' (MERC, 2007).*

The collective research, summary review and site assessment underpins the Department's rationale for designating the maerl bed within Red Bay as a Special Area of Conservation.

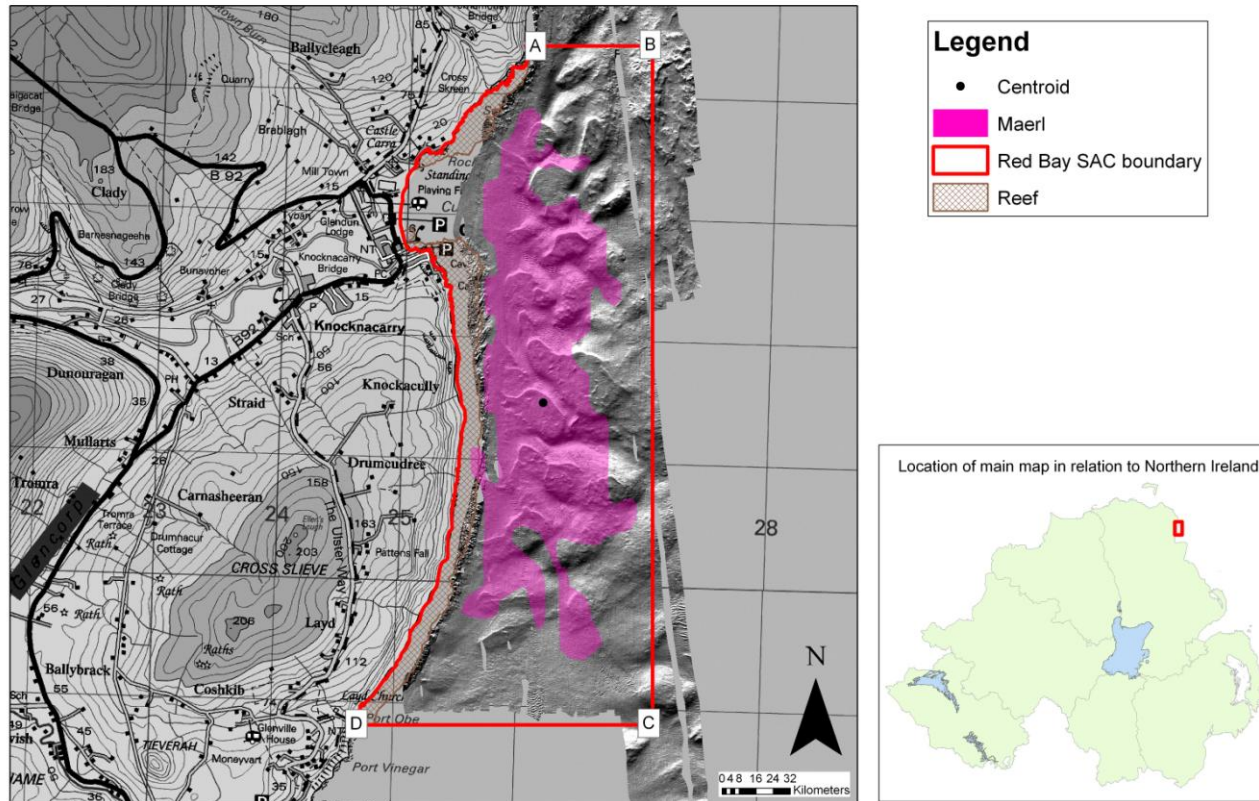
## **5. Site boundary**

The boundary around the Red Bay site has been drawn using the guidance provided by the JNCC (2004, amended October 2008), and was defined through GIS modelling using data from the mapping survey and considered against the guidelines (Aish *et al.* 2008). The key parts of this guidance are that the boundary should be restricted to only include Annex I habitat or that which is required for the maintenance of that habitat and the boundary line defined in whole degrees and minutes and seconds where possible. NIEA have used minutes to two decimal places as an equivalence of seconds as it is more commonly displayed on vessel GPS/Chartplotter systems. The guidance also states that the boundary should include as little non-Annex I habitat as possible, and should also be sufficient to allow for elimination of potential damage to the area from activities such as trawling and dredging.

The Red Bay site conforms to the topographic conditions of the Annex I sub-littoral sandbank definition outlined in section 3 of this assessment. The extension of the boundary into the low water mark permits a clearly defined 'real' boundary and also includes Annex I reef as a secondary feature of this site. The north and south limits of the site are based on two headland landscape features using a line of latitude of whole degrees and minutes.



## Inshore Special Area of Conservation Site Map: Red Bay, County Antrim



*Figure 5.1 Site boundary map highlighting the areas of maerl*

*within the proposed Red Bay, County Antrim SAC boundary.*

*The topography clearly shows the thin coastal strip of Category D reef and the extent of the drowned drumlin sandbanks.*

## 6. Assessment of interest feature(s) against selection criteria

A full explanation of the application of the site selection criteria can be found on the JNCC website: <http://www.jncc.gov.uk/page-1473>.

### *Sandbanks which are slightly covered by seawater all the time*

The Annex I habitat *Sandbanks which are slightly covered by seawater all the time* is the primary reason for the selection of Red Bay as a potential SAC. This habitat covers 326.27 ha (3.26 km<sup>2</sup>), which is approximately 33.79% of the entire site. This Annex I habitat is therefore the sole subject of this assessment against Stage 1A selection criteria which is set out below.

### Annex III selection criteria (Stage 1A)

#### a) Representativity

The Red Bay site lies off the north eastern coast of Northern Ireland and comprises a maerl dominated sub-littoral headland associated sandbank assemblage of both living and sub-fossil species. These sandbanks are a series of drowned drumlins, typified by large mega-ripples of sub-fossil maerl and are probably unique features within a European context. While the site contains typical species associated with sandbanks, it also contains several nationally scarce species (*Cruoria cruoriaeformis*, *Halymenia latifolia* and *Gelidiella calcicola*). Both *C. cruoriaeformis* and *G. calcicola* are recognised as Nationally Important Marine Feature/Biodiversity Action Plan (NIMF/BAP) priority species. In addition to this, the maerl bed at Red Bay appears to be unique in that it supports species at both their northern (*H. latifolia*) and southern (*Luidia sarsi*) biogeographical limits. **The Red Bay site has been graded A (excellent) for representativity.**

#### b) Area of habitat

The evaluation of relative surface area is approximate as it is not possible to calculate an accurate total extent for Annex I shallow sandbank habitat for UK waters. A best minimum estimate, based on the mapped area of sandy sediments less than 20m water depth, of 1,720,000 hectares has been used to assess area habitat. Within the UK N2K network of sites 733,000 hectares have been designated. Using the following thresholds for grades of this criterion (CEC,1995);

A - extents between 258,000 and 1,720,000 ha (15-100% of total resource)

B – extents between 34,000 and 258,000 ha (2-15% of total resource)

C – extents less than 34,000 ha (0-2% of total resource)

The Red Bay site contains 326.27ha of maerl and within a site totalling 965.54ha. Other habitats include shallow rocky reef and sandbanks which fall outside the 20m minimum depth requirement

**The Red Bay site contains less than 0.05% of the national Annex 1 sandbank resource, and is graded C for the area of habitat criterion.**

#### c) Conservation of structure and functions

Within the area there are a number of activities which may have affected the sandbank structure, and may continue to affect the structure of the sandbanks.

The majority of fishing activity off the County Antrim coast is concentrated in waters further offshore as indicated in examination of VMS data for vessels larger than 15m in length. Within the site boundary, the majority of commercial fishing is for lobster and brown crab using static gear although some less than 15m have been seen to occasionally trawl through the site hunting for scallop. Trawling the seabed with towed gear is known to disturb the surface sediments, leaving tracks which slowly fill in over time (Hall-Spenser 2000); therefore previous damage may not now be visible.

Nearby coastal towns in the area include Cushendall, which is located on the shores of Red Bay and Cushendun, which lies at the northern limit of the bay. The largest town in the area is Ballycastle, which lies 6.5km west of Fair Head. There are currently wastewater treatment discharge orders in effect from both Cushendall and Cushendun, both of which comply with the regulations set in place by the Water (Northern Ireland) Order 1999 and the Urban Waste Water Treatment Regulations (Northern Ireland) 1995, in regard to the nature of their discharges. Any wastewater is fine screened, will not exceed a significant amount of solid particulate matter measuring about 6mm in one dimension, and is discharged to sea via a long sea outfall to minimise the effect on the surrounding waters. The Cushendun outfall discharges within the boundary of the Red Bay site and dives conducted within the vicinity of the discharge pipe could not visually detect any sewerage related debris, bacterial mats or increased siltation.

The main economic activities in the Red Bay area are agriculture and tourism. There is also an organic finfish mariculture operation in Red Bay 2.2km south of the Red Bay site's southern boundary line. The fishfarm has been consented since 1987 (Consent No. 2673-87), and has been restricted to a maximum number of 8 cages, containing a maximum number of 50,000 fish per cage. The cages are rotated through the licensed site in order to ensure no long term impacts on the seabed. Water Management Unit within the Northern Ireland Environment Agency (NIEA) regularly monitors the area below and surrounding the cages for any impacts to the chemical and biological conditions, and chemical usage and waste is recorded on a quarterly basis. Additionally, to maintain its organic status, one of the conditions is that chemicals may not be used for the treatment of fish.

Previous studies from other locations have shown that waste from fishfarms or sewage outfalls may be detrimental to maerl beds, as the reduction of water quality due to the input of organic waste into the water column could lead to lowered light intensities and sedimentation (Birkett *et al.*, 1998, Hall-Spencer *et al.*, 2006). The increase in nutrient levels that can occur from both fishfarm waste and agricultural and sewage discharges can lead to eutrophication and the excessive growth of ephemeral species of macroalgae. Eutrophication can also cause increased turbidity of coastal waters due to more prolific growth of phytoplankton. Both of these events can have a detrimental effect to the maerl biotope as they lead to reduced light availability and sedimentation (Birkett *et al.*, 1998). Monitoring by NIEA since 1987 has not detected any significant impacts on the seabed beyond the direct area occupied by the cages. It is probable that the strong currents and open coast location combined with the limited sewage input and good mariculture practices all mitigate against any possible detrimental impacts.

Hydrographically, the site is located at the northern end of the Irish Sea and lies within the North Channel. The Scottish coastline is approximately 22km to the northeast. The Irish Sea is at its narrowest in this area. As a consequence tidal currents

are some of the strongest recorded in Northern Ireland. The ebb tide flows in a northerly direction for up to 9 hours while the filling tide flows in a southerly direction for 3 to 4 hours. There are periods of slack tide around low water, however, high water slack tide is unpredictable and may not occur at all on some days. Currents of up to 4 knots are common in the outer part of the bay during mid tide, and it is a feature of the area that eddy currents form and then dissipate, apparently randomly, during the tidal cycle.

Due to these unique hydrodynamic features it is unlikely that the marine fishfarm, riverine inputs or the wastewater discharges will have any significant impact on the sandbank features. The Review of Consents process, that competent authorities are required by the Habitats Regulations (as amended) to undertake, as soon as reasonably practical after it is established as a Candidate SAC and transmitted to the European Commission, will safeguard against any future changes in the operations of licensed activities that may have a significant impact on the SAC features..

There are no pending applications for aggregate extraction, cable laying or construction within the proposed site boundary. There is a current planning application to construct a 300 berth marina south of the village of Cushendall, 2km south of the Red Bay site boundary.

The gross physical structure of the maerl bed is intact and the biology is representative of the habitat. **The Red Bay site is graded I (excellent structure) for the conservation of structure sub-criterion.**

#### ***Degree of conservation of functions***

Structurally, Red Bay appears to be broadly stable over time. The presence of sub-fossil maerl aged 654 years BP and living maerl indicates that the site is relatively stable. There is no evidence to suggest that the ecological function of the maerl bed is currently being affected although the recent discovery of a range extension of two large species (*Luidia sarsi* and *Maja brachydactyla*) may be an early indication of climate change. **The Red Bay site is graded I (excellent prospects).**

#### ***Restoration possibilities***

Currently the site is not in need of restoration since no extractive activities have been exercised within the sites. Given the dominance of a sub-fossil maerl component which has been demonstrated to be 654 years BP, it is unlikely that the site could be restored if extraction were permitted in the future. To date the site appears to have not been damaged by mobile fishing gear and it is important to protect the site from sustained heavy fishing activities. The impact of any new fishing within the area would need to be subject to an appropriate assessment. The maerl thalli and associated epibiota are sensitive to mechanical damage although the naturally occurring extreme hydrodynamic conditions experienced at the site demonstrate the natural resilience of the features. **Given the uniqueness of the site and the age of the sub-fossil maerl deposits, the site has been graded III (restoration difficult or impossible) for the restoration possibilities sub-criterion.**

#### ***Overall grade:***

When grade I for the first sub-criterion, and grade I for the second sub-criterion are combined, the overall grade for the criterion is A: excellent conservation, irrespective of the grading assigned to the third sub-criterion. **Grade A (excellent conservation)**

#### d) Global assessment

The suggested grades for Stage 1A criteria a)-c) are A, C and A respectively. The comparatively small size of the site when viewed as a national extent of resource should not be used to downgrade the global assessment. **Due to the uniqueness of this site in a European context in that it consists of a unique bathymetric drowned drumlin landscape, sub-fossil maerl deposits aged at least 654 BP very rich species biodiversity, and nationally rare species, the Global Assessment grade is A (excellent conservation value).**

#### *Summary of scores for Stage 1A criteria*

Area of habitat	Representivity (a)	Relative surface (b)	Structure and function (c)	Global assessment (d)
Red Bay, Co Antrim	A	C	A	A

### 7. Sites to which this site is related

The Red Bay site lies 15km south of Rathlin SAC which is also designated on the basis of Annex 1 habitat *Sandbanks which are slightly covered by seawater all the time*. Rathlin is also designated for *Reefs* and *Sea caves*. Rathlin is also as a Special Protection Area (SPA) under the Birds Directive for peregrine *Falco peregrinus*, chough *Pyrrhocorax pyrrhocorax*, razorbill *Alca torda*, guillemot *Uria aalge* and kittiwake *Rissa tridactyla* and breeding seabirds in general. The sandbanks are considered an important habitat supporting sandeel species on which the breeding seabirds depend. Several small maerl beds are present within Rathlin SAC and are very different in nature to the Red Bay site. Further south (24km) from Red Bay is the Maidens Area of Search (AoS) site which may be designated in 2010 on the basis of Annex 1 habitat *Reefs*. 20km to the west of Rathlin Island is an AoS site known as the Skerries which may be designated as an SAC for sandbanks, caves and reefs. Maerl has not been found at the Skerries site. Strangford Lough SAC/SPA, 60km south of Red Bay is also designated under the Habitats and Bird Directives and while it is not designated for *Sandbanks which are slightly covered by seawater all the time* it is designated as a *large shallow inlet and bay* and does have several small maerl beds within its boundary. Murlough SAC, 100km south of Red Bay is designated for Annex 1 habitat *Sandbanks which are slightly covered by seawater all the time* although no maerl has been recorded at this site.

## 8. Supporting scientific documentation

Scientific information on the topography, habitats and species present in the Red Bay, County Antrim proposed SAC is available from a number of sources. These are listed in the table below:

Reference	Description/Purpose of study	Data Type
Erwin, D.G., Piction, P.E., Connor, D.W., Howson, C.M., Gilleece, P. and Bogues, M.J.(1986). The Northern Ireland Sublittoral Survey. Report for the Department of the Environment Northern Ireland, Ulster Museum, Belfast.	Comprehensive diving survey of Northern Ireland designed to identify Marine Nature Reserves.	999 sites, written descriptions, species lists, photographs and particle size analysis of sediments.
Vize, S.J. (2005). The distribution and biodiversity of maerl beds in Northern Ireland. PhD Thesis, School of Biology & Biochemistry, Queens University Belfast.	A review description of all known maerl sites within Northern Ireland territorial waters including Red Bay Co. Antrim.	Grabs, cores, pipe dredge, diver and drop video, remote acoustic techniques, morphology, species id., experimental damage trials and sediment analysis.
Swath Services. (2006). Interferometric sonar survey for the east Antrim Maerl Beds.	Geoswath Interferometric seabed survey. The data from this report was analysed by MERC Consultants and reported in MERC 2007	Bathymetry & backscatter data.
MERC Consultants. (2007). Dive Survey Mapping of Maerl Beds at Red Bay Potential Marine Special Area of Conservation. Report prepared for Environment & Heritage Service (now Northern Ireland Environment Agency).	Survey of proposed SAC site (Cushendun Bay) and additional site at Garron Point.	Dives, drop camera (211)and 15cm x 15cm quadrats (40).
QUERCUS. (2008) Assessment of extent and abundance of maerl beds and their associated biodiversity along the East Antrim coast. Report prepared for Environment & Heritage Service (now Northern Ireland Environment Agency).	Compilation of all known data on maerl in Northern Ireland and production of an assessment of the representivity of the Red Bay site compared to other UK and Irish sites. The report also sourced grey literature datasets.	Morphological analysis of maerl and radiocarbon dating in addition to algal and faunal epibiota analysis of the 40 MERC quadrats.

## 9. Site overview and conservation interest

### 9.1 Sediment Conditions and Bathymetry

The Interferometric survey has revealed a complex seabed comprising drowned glacial drumlins overlaid with a veneer of fine sands, maerl deposits, gravels and cobbles. In places the maerl exists as flat plains and in others it is banked into large mega-ripples *ca* 3m in height. No such mega-ripples were found at the Garron Point site.

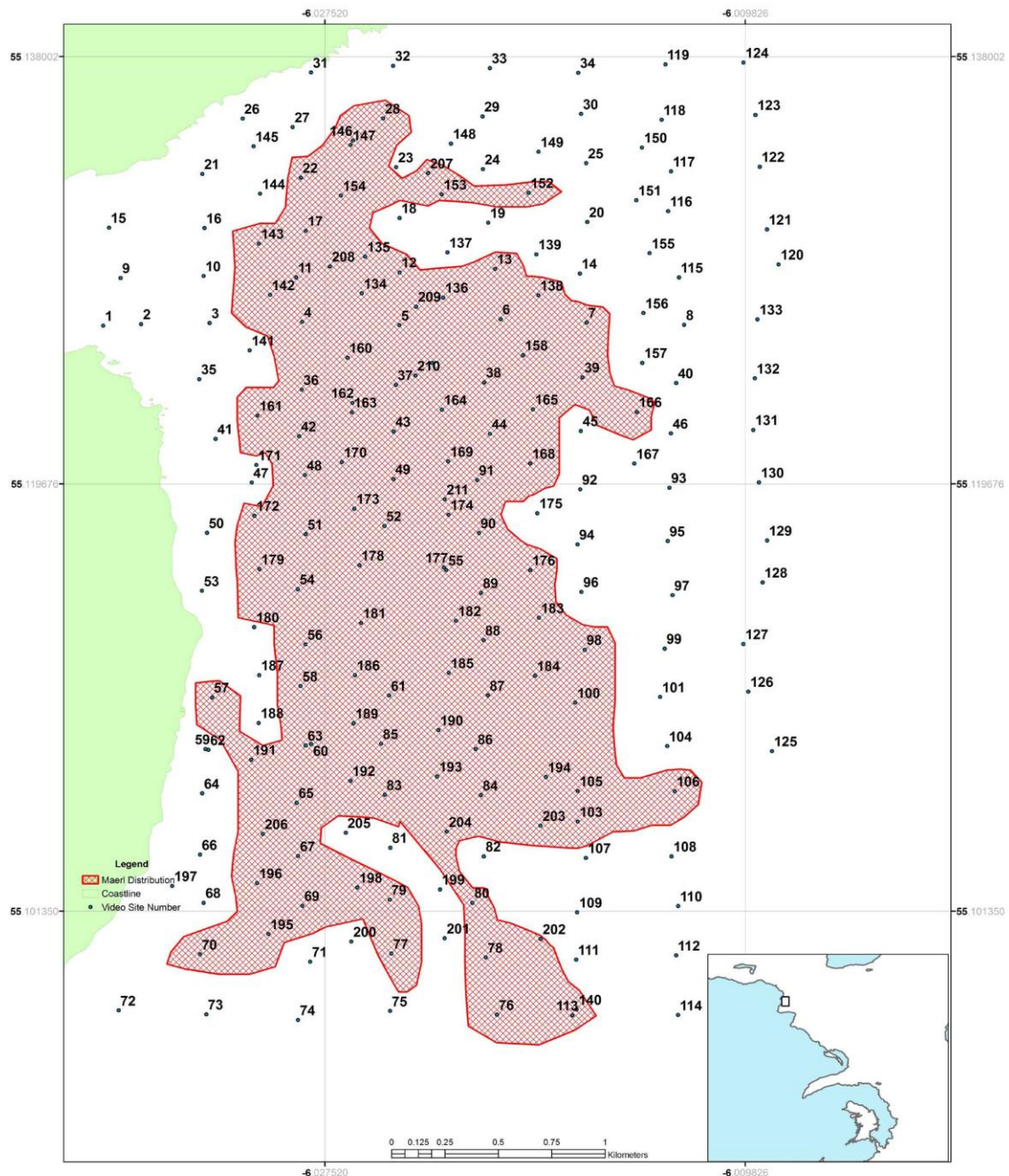


*Figure 9.1 Video grab image of maerl mega-ripples.*

West towards the shore the sediment gives way to a fringing rocky reef which extends into the intertidal zone as a hard rocky shore. Sand sediments do encroach into a small sheltered sandy beach in the north west corner of the SAC, just north of the mouth of the River Dun. Further north than this the shoreline reverts to a hard rocky shoreline. Eastward away from the shore the site slopes down to depths in excess of 40m and the sandbank features merge into a flat gravel plain. The spatial extent of the maerl banks was determined by the presence of either living or sub-fossil maerl as revealed by the drop video survey (Figure 9.2). The boundaries are estimated to lie midway between sampling stations where no maerl was recorded and the next adjacent station where maerl was recorded.

Figure 9.2 Map indicating extent of maerl and cobble/sand dominated sediments.

From Figure 9.3, it can be clearly seen that there is a strong relationship between the presence of bank structures and the presence of maerl. The green and blue circles indicate the presence of either living maerl and/or sub-fossil maerl. The pink circles indicate cobble dominated sediments and the yellow circles indicate sand dominated sediments. The underlying black & white image is a sunlit shaded relief map of the bathymetry clearly showing the sandbank features of the site. A rocky outcrop is clearly visible on the western edge of the map. Patches of maerl were also observed in some rocky crevices.





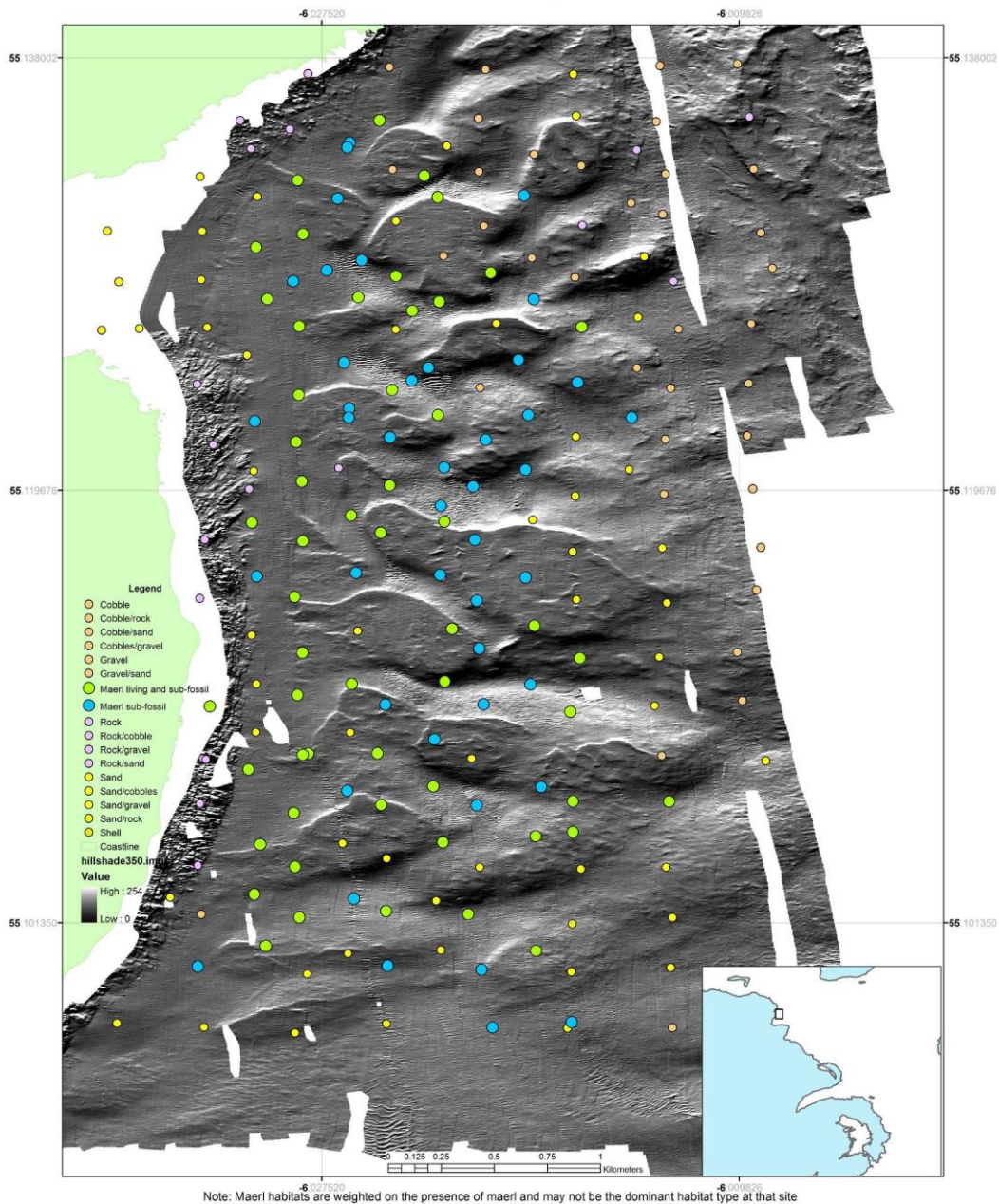


Figure 9.3 Map indicating sandbank structures and habitat types

For the purpose of this assessment, a maerl bed is considered to be any area of seabed where the cover of living or sub-fossil maerl is equal to or greater than 5% cover. The more extensive maerl bed occurring within the two areas surveyed by MERC was located in Red Bay. This is perhaps related to the hydrography of the Red Bay area, which is less exposed to tidal currents due to its location within a shallow embayment, than is the seabed south of Garron Point.

While a main objective of the study was to define accurate boundaries for the maerl beds along the East Antrim coast, it must be considered that a maerl bed is not a fixed feature on the seabed and some variation to boundaries can occur over time as result of natural and physical processes. Bearing this in mind, the main maerl bed at Red Bay was mapped to a resolution of approximately 65m, while all other maerl beds

identified during the MERC survey were mapped to a resolution of approximately 125m.

### **Distribution of maerl**

The two county Antrim sites surveyed by MERC represented good examples of the rare biotope “*Phymatolithon calcareum* maerl beds with red seaweeds in shallow infralittoral clean gravel or coarse sand”. Habitat code: SS.SMPMrl.Pcal.R.

*Phymatolithon calcareum* is listed in Annex V of the EU Habitats Directive (Directive 92/43/EEC). Annex V of the directive deals with animal and plant species of community interest whose taking in the wild and exploitation may be subject to management measures. Maerl beds are currently one of only six soft sediment biotope complexes under review by the UK Marine SACs Project. This means that they are considered to be of high conservation interest at the European level, and a priority feature of candidate marine Special Areas of Conservation (SACs).

### **Distribution of live and dead maerl**

The maximum percentage cover of live maerl found during the quadrat study was 41.6% in Red Bay (RB43), and 40.1% at Garron Point (GP35), with the average being 13.83% and 16% respectively. Sub-fossil maerl was found to be in the range 58.4% to 100% in Red Bay, and from 0% to 100% at Garron Point. The drop video survey found both living and sub-fossil maerl in greater abundances in Red Bay than at Garron Point (Figures 3.7 to 3.10). The boundary encompasses the total area where maerl was found, and the boundary line is designated where maerl was not recorded for three consecutive sites. The difference in the percentage cover recorded between the different sampling strategies is most likely due to the variability between the exact sites of samples.

In a study in Milford Haven, the maximum percentage cover of live maerl in the study site was 50% with the average being approximately 10% (Bunker and Camplin, 2006). A survey at St Mawes Bank in Cornwall (Howson *et al.*, 2003) recorded the average percentage cover of live *P. calcareum* to be 88% cover in some areas and 64% was recorded in Linnhe Mhurich, West Scotland (Bunker, 1999).

Although the amount of live maerl recorded in this study may appear relatively low in comparison with other areas of the UK, dead deposits of maerl have been shown to harbour a greater diversity and abundance of associated organisms than surrounding habitats (Birkett *et al.*, 1998; Steller *et al.*, 2003).

Substratum characteristics have been identified as a potential influence on diversity, distribution and abundance of organisms associated within maerl beds (Bosence, 1979; De Grave, 1999). Maerl beds can be composed of a number of distinct sedimentary facies, with the maerl beds in Red Bay and Garron Point found to have approximately 20-30cm of maerl cover on coarse sand and gravel, with some areas mixed with cobbles, pebbles and shell. Surveys of maerl habitats have found that there are distinct faunal communities associated with the various facies of maerl (Bosence, 1979; Hily *et al.*, 1992; De Grave, 1999). The high spatial heterogeneity of the maerl beds in Red Bay and Garron Point provide a stable habitat for the associated biodiversity.

### **Morphology of maerl**

Discoidal growth forms have been shown to be found in areas of higher exposure to water movement (Bosence, 1883b; DeGrave *et al.*, 2000) and develop as a response to

frequent turning on a fine to medium grained substratum where downward growth is prohibited (Bosence, 1976). The current maerl present in Red Bay is primarily discoidal, which is unsurprising given the current regime of this area of coastline. The sub-fossil thalli appear to be both discoidal and ellipsoidal, which could indicate that there was less water movement along this coastline in the past, as changes in overall thalli shape have been found to occur as the turning of the thalli changes (Bosellini and Ginsburg, 1971; Bosence, 1976). More investigation into the morphology of current and sub-fossil thalli is recommended before any conclusions are drawn.

The sub-fossil maerl thalli aged from Red Bay were aged at 654 years BP indicating that these deposits have been present in Red Bay for a considerable time.

## 9.2 Biodiversity

### *Algal diversity in Red Bay maerl beds*

In comparison to a studied site in Milford Haven (Bunker and Camplin, 2006) the number of plant taxa was greater at all but two of the North Antrim sites, one of which is a site entirely composed of sub-fossil maerl (RB91). The three sites containing a significant amount of live maerl (GP35, RB160 and RB43) all contained relatively high numbers of plant taxa. GP19 supported the highest number of taxa, yet does not contain a significant amount of live maerl. Table 9.1 shows a comparison of the number of macroalgal species found on maerl around the UK (Full table Appendix III of the QUERCUS Report). It must be noted, however, that there is a very strong seasonality with algal species associated with maerl beds, with only about half of the characteristic macroalgal species associated with maerl beds being found throughout the year, and most of the others being recorded in summer (Jacquotte, 1962; Cabioch, 1969). One of the most important species associated with maerl beds, *Halymenia latifolia*, has a very restricted seasonality, being obvious only in late summer/autumn (Maggs and Guiry, 1982). It is recommended that future survey activities be carried out at different times of the year so that a more comprehensive species list can be recorded for this area.

**Table 9.1.** Comparison of macroalgal species numbers on maerl beds in the UK (Table reproduced from Birkett *et al.*, 1998). It is noted that the Carraroe and Finavarra values were obtained by year-round surveys.

Fal Estuary (Rostron, 1988)	Milford Haven	Scotland	Carraroe (Galway) (Maggs, 1982)	Finavarra (Clare) (Maggs, 1982)	East Antrim coast (grab and quadrat survey)
53	53	38	135	128	78

The presence of three algal species that are almost completely confined to maerl beds, and whose presence in the UK is rare, was recorded within the area of the Red Bay maerl bed. *Cruoria cruoriaeformis* was found at three sites within the Red Bay area, and although this is the second record of this species in Northern Ireland, it is the first specimen collected from field observations. The first record of *C. cruoriaeformis* was observed to develop on maerl from Strangford Lough which was maintained in aquarium conditions. *Halymenia latifolia* was found in 3 sites within the Red Bay area and is the first record within Northern Ireland. *H. latifolia* was originally described from maerl beds in Brittany and has been recorded in Galway and Clare maerl beds where it becomes conspicuous only in late summer and autumn. The rest of the year is spent as a boring filamentous stage living in dead maerl only. *Gelidiella calcicola*, a species that is endemic to maerl beds and has been documented as aiding the stability of maerl beds, was found at three sites within the Red Bay area. Other algal species that have been reported as aiding the stability of maerl beds, such as *Brongniartella byssoides* and *Spermothamnion repens*, were also found during this survey in both Red Bay and Garron Point. It was also noted during identification that there is an unusually high amount of *Stenogramme interrupta* present in both sites. This is close to the geographical limit of *S. interrupta* which occurs in Loch Ryan in Scotland but not further north.

There were significant variations in algal species composition between most of the sites, with particular species being shown to account for the differences. The three

pairwise tests identifying sites where the algal species component is not significantly different could be attributed to the high spatial heterogeneity of maerl beds in this area. The percentage of live and dead maerl did not contribute to the variability of algae in this study, indicating the importance of dead as well as live maerl beds to the maintenance of high algal diversity.

### ***Infaunal diversity in East Antrim maerl beds***

The number of animal taxa was significantly lower at RB91 than in any other site (Table 9.2). RB160 exhibits the highest species richness and abundance. RB91 was recorded as being 100% sub-fossil, having a much more open structure than finer gravels and sand, which could affect diversity as substrate characteristics have been identified as a potential influence on the diversity of maerl beds (Bosence, 1979; De Grave, 1999).

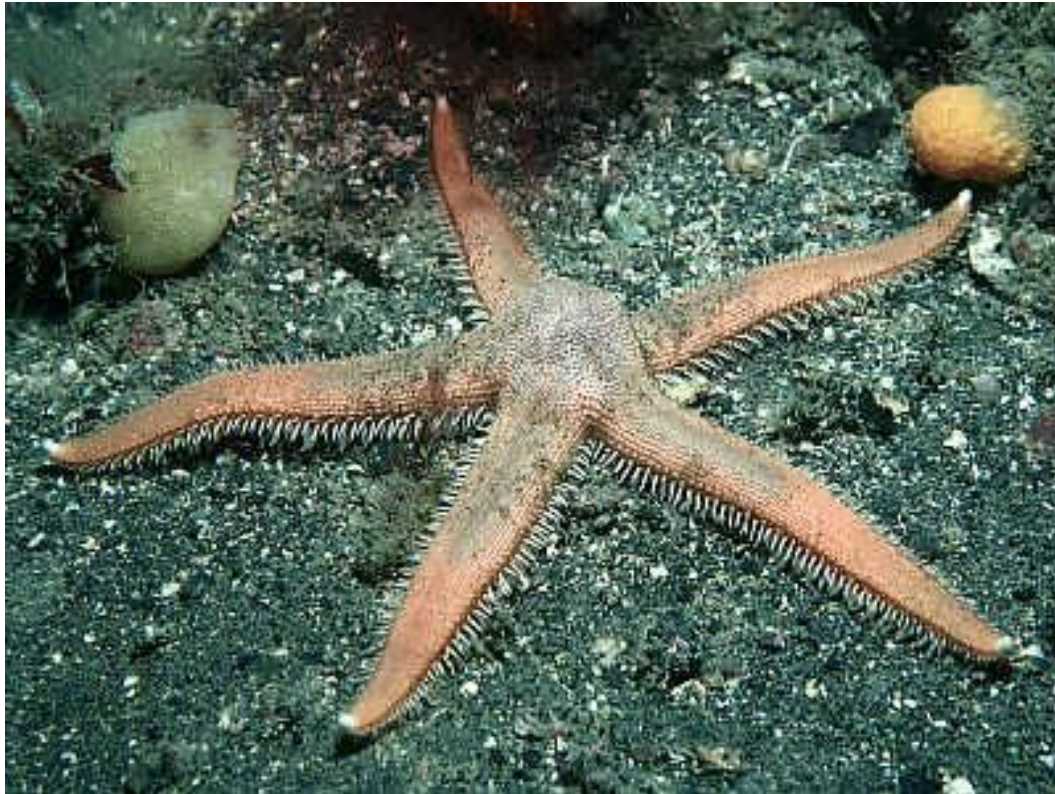
Distinct faunal communities are associated with various facies of maerl (Bosence, 1979; Hily *et al.*, 1992; De Grave, 1999), from those that move within the upper maerl lattice, to the burrowing infauna that live in the mud and sand matrix beneath the surface of the bed. RB91 has a deep sub-fossil deposit of maerl, which may not support as diverse species as other sites as it has a more even structure over its depth.

**Table 9.2.** Comparison of number of infaunal taxa found during this survey and in previous studies

	RB43	RB91	RB160	RB198	GP19	GP35	Survey Total	Milford Haven (Bunker and Camplin, 2006)	Antrim Total (Vize, 2005)
<b>Total Number of Species</b>	109	28	129	85	119	91	251	103	165

Overall the results show a similar evenness in community composition between the two beds in Red Bay and Garron Point. There were significant variations in the infaunal species composition between most of the sites, however, with particular species being shown to account for the differences. The three pairs of sites where the infaunal species component is not significantly different are probably due to the high spatial heterogeneity of maerl beds in this area. The heterogeneity of maerl deposits has previously been correlated with the high diversity of fauna associated with maerl (Hall-Spencer, 1998, Stellar *et al.*, 2003). The data clearly shows that the diversity at the East Antrim sites is higher than existing SACs in England and Wales.

The biodiversity of the Red Bay site is very rich, especially given the relatively small size of the site. The presence of *Luidia sarsi* in the Red Bay area is extremely rare, as it is a cold water indicator species. Although the distribution of *L. sarsi* has been recorded from Norway to the Mediterranean, in southern waters it is usually found in much deeper and colder waters. This is the only Irish Sea record.



*Figure 9.4 Luidia sarsi. Image courtesy of National Museums Northern Ireland (NMNI).*

### 9.3 Fish and Mammals

Commercial fishing activity within the proposed site appears mainly restricted to pot fishing for lobster *Homarus gammarus* and brown crab *Cancer pagurus*.

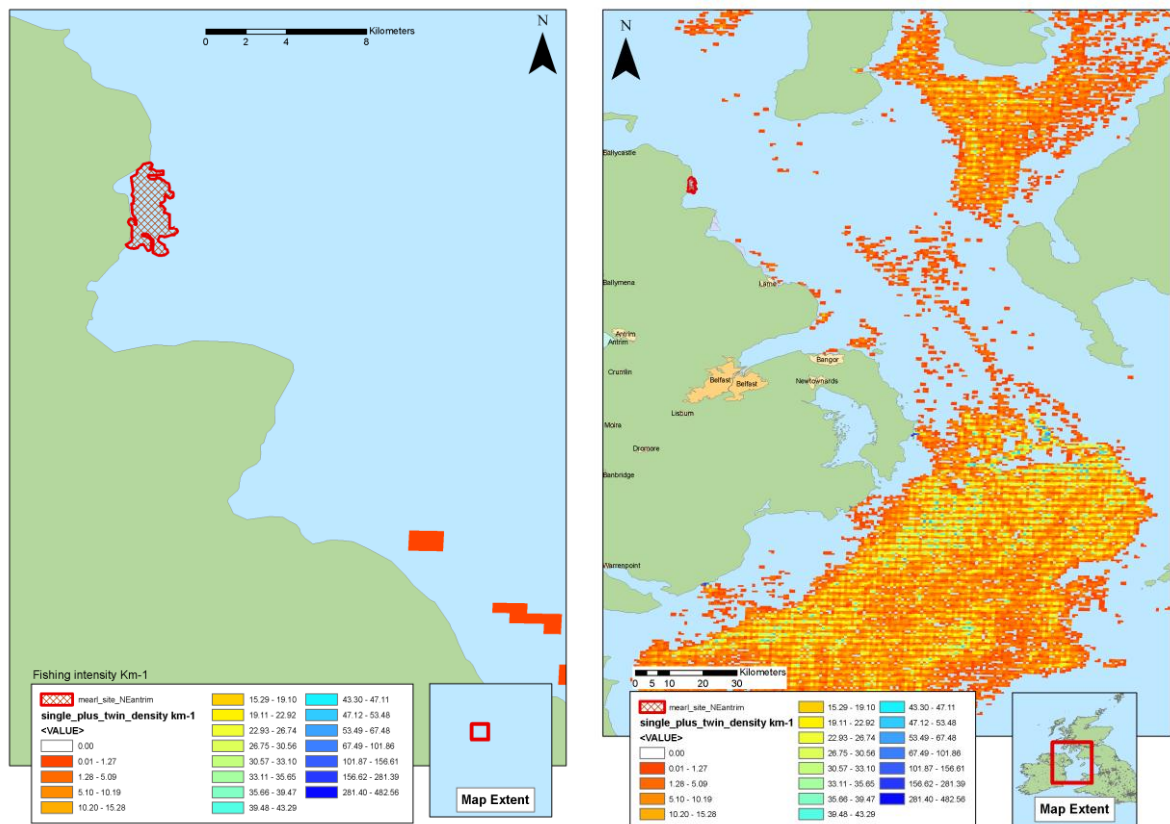


Figure 9.5 Maps indicating intensity of fishing effort within Red Bay, Co Antrim and wider maritime areas.

Data provided by Fisheries Division of the Department of Agriculture and Rural Development indicates that no vessels over 15m in length fish within the proposed boundary. The major fishing effort is concentrated further to the east and south. While smaller vessels may occasionally fish within Cushendun Bay, the diving survey would conclude that even though scallops were observed on the seabed, densities are very low (Joe Breen *pers obs*).

A recent review of shark, skate and ray catches (recreational and commercially from within Northern Ireland waters (Agri-Food & Biosciences Institute, 2009) has revealed the high diversity of elasmobranch species that are regularly caught within the Red Bay area. Basking shark *Cetorhinus maximus*, lesser-spotted dogfish *Scyliorhinus canicula*, nursehound *Scyliorhinus stellaris*, spurdog *Squalus acanthias*, common skate *Dipturus batis*, cuckoo ray *Leucoraja naevus*, blonde ray *Raja brachyuran* and thornback ray *Raja clavata* have all been recorded in either recreational or commercial catches, or scientific surveys within the immediate Red Bay area.

Significantly, Red Bay has the highest abundance of specimen fish catches in Northern Ireland for the lesser spotted dogfish *Scyliorhinus canicula*, nursehound

*Scyliorhinus stellaris*, spurdog *Squalus acanthias*, common skate *Dipturus batis* and blonde ray *Raja brachyuran*.

Potential nursery grounds for cuckoo ray *Leucoraja naevus* have also been identified in the Red Bay area. Spurdog have been caught carrying pups during November to January along the Antrim coast, especially in the Red Bay and Ballycastle areas. This may suggest local pupping grounds.

The development of deep water coastal angling off the Northern Irish coast over the last decade has also resulted in the capture of high numbers of common skate *Dipturus batis* from two principal areas; Ballycastle and Red Bay. One charter skipper in Red Bay recorded 7 large skate in excess of 200lb in 2008, in addition to numerous smaller fish ([www.predatorireland.com](http://www.predatorireland.com)).

Relatively few cetacean species have been recorded from within the immediate Red Bay area, however, the diversity of these highly mobile species reported from the wider inshore waters of the Larne-Rathlin area is relatively high. Visual observations from land and sea have recorded harbour porpoise *Phocoena phocoena*, bottlenose dolphin *Tursiops truncatus*, common dolphin *Delphinus delphis*, minke whale *Balaenoptera acutorostrata*, Risso's dolphin *Grampus griseus* and killer whale *Orcinus orca* as seasonally present in the area.

Analysis of the available data from Larne-Rathlin area indicates that 57.1% of all cetacean sightings (697 animals) relate to the harbour porpoise. The second most frequently reported cetacean is the bottlenose dolphin, comprising 16.3% (199 animals) of records. While all cetaceans are European Protected Species (Annex IV) under the EU Habitats Directive, the two most frequently recorded species in the area (harbour porpoise and bottlenose dolphin) are both listed under Annex II.

Few seal records are available for the Red Bay area compared to other sites around Northern Ireland reflecting the absence of haul out areas within the proposed boundary. However, grey seals *Halichoerus grypus* and common seals *Phoca vitulina* are known to forage throughout the area, predominantly the highly mobile grey seals. The results of a thermal image survey of seals around the coast of Northern Ireland (Duck, 2006) did not record either grey or common seals in Red Bay but did detect 9 seals in the water around fishfarm cages just to the south of the proposed area. Rathlin Island SAC, 15km to the north west, is an important site for seals with up to 128 harbour seals recorded as hauled out during thermal image surveys and up to 60 grey seals recorded during land-based counts. The Maidens Islands c. 23km to the south east is monitored by NIEA staff with 25-45 greys seals typically counted during boat surveys (exceptionally 50-70).

There is a single record for a marine turtle (an unidentified cheloniid) within Red Bay, recorded 1.5km north east of Cushendall in 1994 (King, 2006).

Due to the very strong tides the area is not popular with SCUBA divers although some clubs use the wreck of the *Clemintina* close to Cushendun beach for training dives. *Seasearch*, a national project for sports divers managed through the Marine Conservation Society conducted some dives during 2008 and 2009 discovering snake pipefish *Entelurus aequoreus* to be abundant in the area. They also recorded the presence of the spiny spider crab *Maja brachydactyla* at a site just south of the proposed boundary. This is a southern species which has been rapidly extending its range over recent years moving north around the north coast down into the Irish Sea. There is no current fishery for this species.



## Conclusions

The patchy distribution of live maerl across the site does not appear to affect the general biodiversity of the area. Studies have shown that deposits of dead maerl house greater diversity than surrounding habitats (Birkett *et al.*, 1998; Hall-Spencer, 1998; Vize, 2005), thus, the conservation value of dead maerl habitats equals that of the live maerl. This is reinforced by the examples of different biotopes that are found over a relatively small area in this study site.

The beds at Red Bay and Garron Point are similar in both epibiota and infaunal species composition, with the maerl bed at Red Bay being more extensive and containing both faunal and floral species rare to the Northern Ireland coastline. All three of the seaweed species more or less confined to maerl (*Cruoria cruoriaeformis*, *Halymenia latifolia* and *Gelidiella calcicola*) were listed as nationally scarce species that are potentially threatened, in a review carried out in 2006 by MarLIN for Natural England. Both *C. cruoriaeformis* and *G. calcicola* are recognised as Nationally Important Marine Feature/Biodiversity Action Plan (NIMF/BAP) priority species (Appendix V).

Although there are some differences between Red Bay and Garron Point, there is also heterogeneity among locations within each bed. Such heterogeneity suggests that the maerl bed at Red Bay may provide a good representation of East Antrim maerl beds and their associated biodiversity. In addition to this, the maerl bed at Red Bay appears to be unique in that it supports species at both their Northern (*H. latifolia*) and southern (*Luidia sarsi*) (shallow water) biogeographical limits.

The physical structure of the Red Bay site, based on a drowned drumlin landscape, fits the description of the Annex 1 feature ‘Sandbanks which are slightly covered by seawater all the time (EU 2007a) i.e. ‘Sandbanks are elevated, elongated rounded or irregular topographic features, permanently submerged and predominantly surrounded by deeper water’. While maerl is present at the Garron Point site, such sandbank physiographical features do not exist. As a result of this only the Red Bay maerl bed is proposed as a Special Area of Conservation.

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