

**ECOREGION**      **General advice**  
**SUBJECT**        **Update of cold-water coral and sponge maps and the information underpinning such maps on Vulnerable Marine Habitats (including Hatton and Rockall Banks)**

**Advice summary**

ICES advises that:

- A revised boundary be defined for the Northwest Rockall closure, based on new data.
- A closure boundary be implemented for the Anton Dohrn Seamount, based on new data.
- No revision be made for other existing closures, including those at Hatton Bank, Reykjanes Ridge, and in the Bay of Biscay, due to insufficient new data.

ICES has updated its coral and sponge database and distribution maps for the North Atlantic.

**Request**

- *Continue to update cold-water coral and sponge maps and the information underpinning such maps. This should include any new information pertinent to the boundaries of existing fisheries closures for sensitive habitats/vulnerable marine ecosystems [VMEs] (EC and NEAFC standing request).*
- *Provide advice on appropriateness of current closure boundaries on Hatton and Rockall Banks. The advice should be based on all available information on distribution of vulnerable habitats in those areas including from research vessel surveys, observer programmes and fisheries as well as data on the size of catches and condition (live/dead) of corals and sponges (NEAFC request).*

**ICES advice**

New data on VMEs (including cold-water coral reefs) for the Rockall Bank include observations of live corals from scientific trawl, underwater TV surveys, and historical records (observations by fishers) of coral bycatch taken during commercial trawling operations (Figure 1). Based on these new data, a revised boundary that better reflects the occurrence of VMEs is advised for the Northwest Rockall closure area (Figure 2; Table 1).

New data on the presence of VMEs on the Anton Dohrn Seamount were available from multibeam echosounder records and underwater imagery. These data were used along with predictive habitat modelling to define areas of VME occurrence (Figure 3). If management authorities wish to protect the VMEs on the Anton Dohrn Seamount, ICES advises that a closure to all bottom-contacting fisheries be implemented on the steep slopes of this seamount (Figure 4; Table 2).

New data on VMEs on the Hatton Bank consist of coral bycatch records from scientific observers on a commercial longline survey (Figure 5). New multibeam data were obtained from the Edora's Bank (southwest of Hatton Bank). ICES considers these data insufficient and therefore advises that no revision of the existing closure in these areas should be made at this time.

From the Reykjanes Ridge, two trawl-bycatch records of VMEs were made available from Russian surveys in the 1980s. ICES considers these data insufficient and therefore advises that no revision of the existing closure in this area should be made at this time.

In the Bay of Biscay, ICES is aware of the existence of new data on VMEs from 12 scientific underwater TV surveys that were conducted on the canyons and the open slope of this area (Figure 6). As these data are still being processed, ICES could not advise on closures to protect VMEs in the Bay of Biscay at this time.

New data on VMEs were made available from Norwegian habitat mapping surveys. These indicated the presence of new coral reefs and sponge grounds as well as soft-bottom and hard-bottom coral gardens off northern Norway (Figure 7).

## **Recommendations**

ICES recommends that up-to-date NEAFC and EU VMS data for deep-water areas be made available to support the provision of advice on VMEs in 2012. This will enable better assessment of the spatial extent of fishing activities and their potential impact on VMEs. Ultimately this will lead to a stronger advisory basis for the definition of closure boundaries. ICES has access to the NEAFC Vessel Monitoring System (VMS) data, which are appropriate for high seas areas (need yearly updating). However, to advise on areas within the European fishing zone, such as the Bay of Biscay, access to the European VMS data is needed.

## **Background**

For the purposes of this advice, VMEs are sites where structural corals and sponges occur.

The data upon which this advice is based comes from a variety of sources, including multi-beam echo-sounder surveys, trawl surveys, long-line surveys, fishers' knowledge, habitat modelling, and seabed imagery surveys. Within the context of this advice, "new data" refer to information sources not previously available to ICES; these may include historical data as well as recent empirical observations.

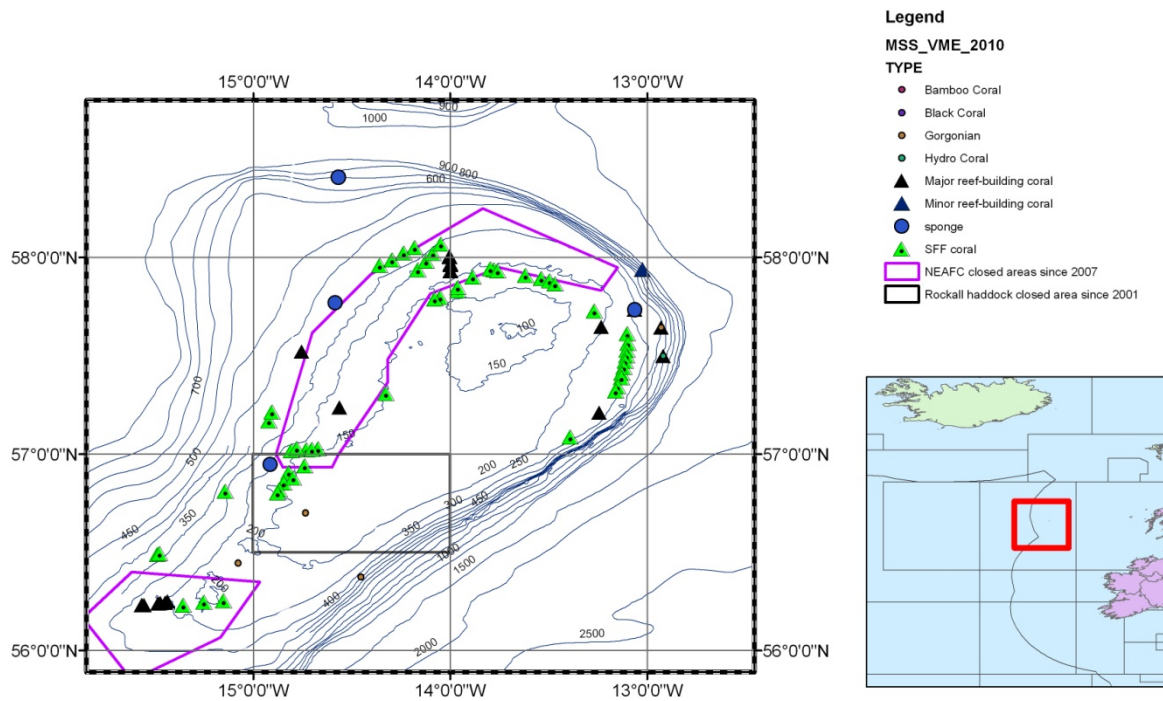
In providing the advice on revised boundaries, ICES has taken the following considerations into account:

- The source of the evidence: scientific survey and anecdotal observations by fishers.
- The quality of the evidence: methods by which observation were obtained, e.g. bottom trawl or longline, age of data, and whether the VME organisms were dead or alive.
- Information on fishing activity, e.g. VMS, plots of actual fishing tracks, or an alternative assessment of the spatial extent of fishing activity in the area of interest.
- As the impact of trawling extends beyond the immediate position of the vessel, the closure incorporates a buffer zone of twice the water depth.

## ROCKALL BANK

### New information available

New data on VMEs (including cold-water coral reefs) for Rockall Bank were made available from trawl and underwater TV surveys. New data were also available from the Scottish Fishermen's Federation (SFF) on records of coral bycatch taken during commercial trawling operations from the 1970s to 2008 (Figure 1).



**Figure 1** Rockall Bank showing the existing Northwest Rockall closure (purple boundary in Northwest) in relation to new data on VMEs, including video footage, bycatch records from research surveys, and fishers' bycatch observations (SFF coral).

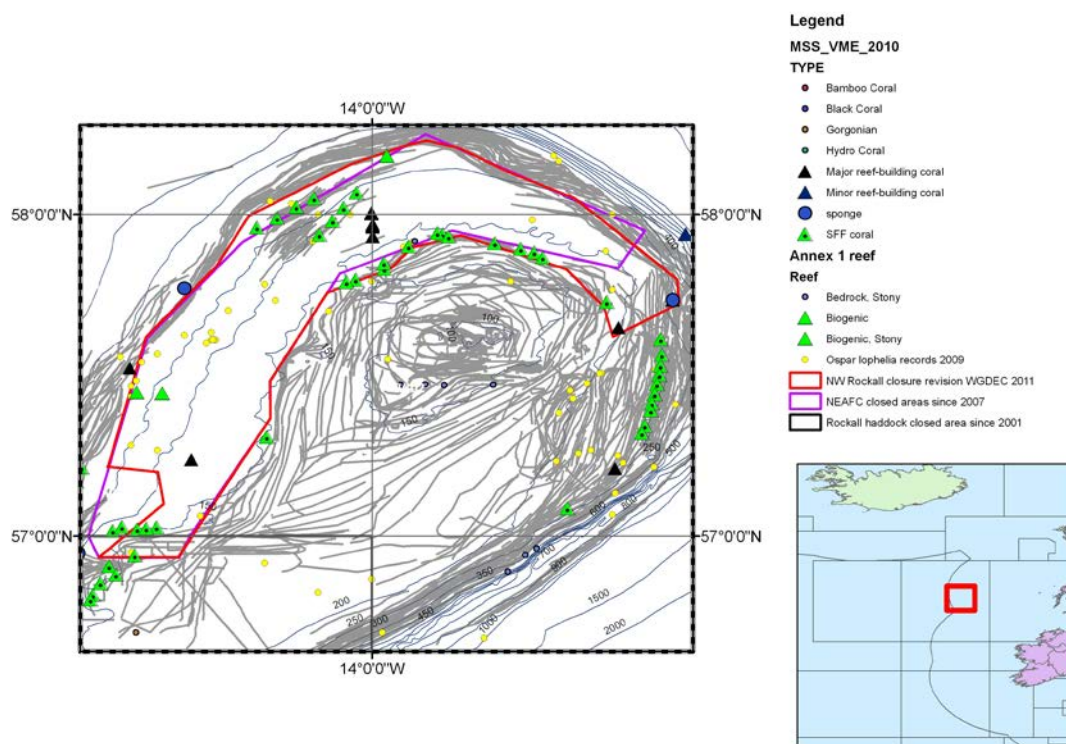
There are also new data from underwater TV survey for the region in the south of Rockall Bank, known as the Empress of Britain Bank that NEAFC has closed since 2008 (Figure 1).

### Closure boundaries

The new data on VMEs confirm the presence of cold-water coral in the existing Northwest Rockall closure and suggest the presence of corals and sponges in areas that are located just outside this closure. ICES advised in 2007 to revise the area in the southwest corner of the Northwest Rockall closure due to evidence of heavy trawling in the past. On the basis of these various data sources it is advised that the existing closure boundary be modified to better reflect the presence of VMEs. The boundary should be modified according to Figure 2. The coordinates of the polygon that form the revised boundary are given in Table 1.

The new TV observations of live coral from the Empress of Britain Bank of Rockall Bank were from inside the closure. This confirms the closure is appropriate and there is no reason to consider revising the boundary at present.

There is no further new information pertinent to other existing closures on Rockall Bank.



**Figure 2** Proposed boundary revision (red line) for the Northwest Rockall closure. Grey lines are trawl tracks from commercial fishing vessels operating in the area between the 1980s and 2008 (source SFF).

**Table 1** Coordinates of the proposed boundary revision for the Northwest Rockall closure.

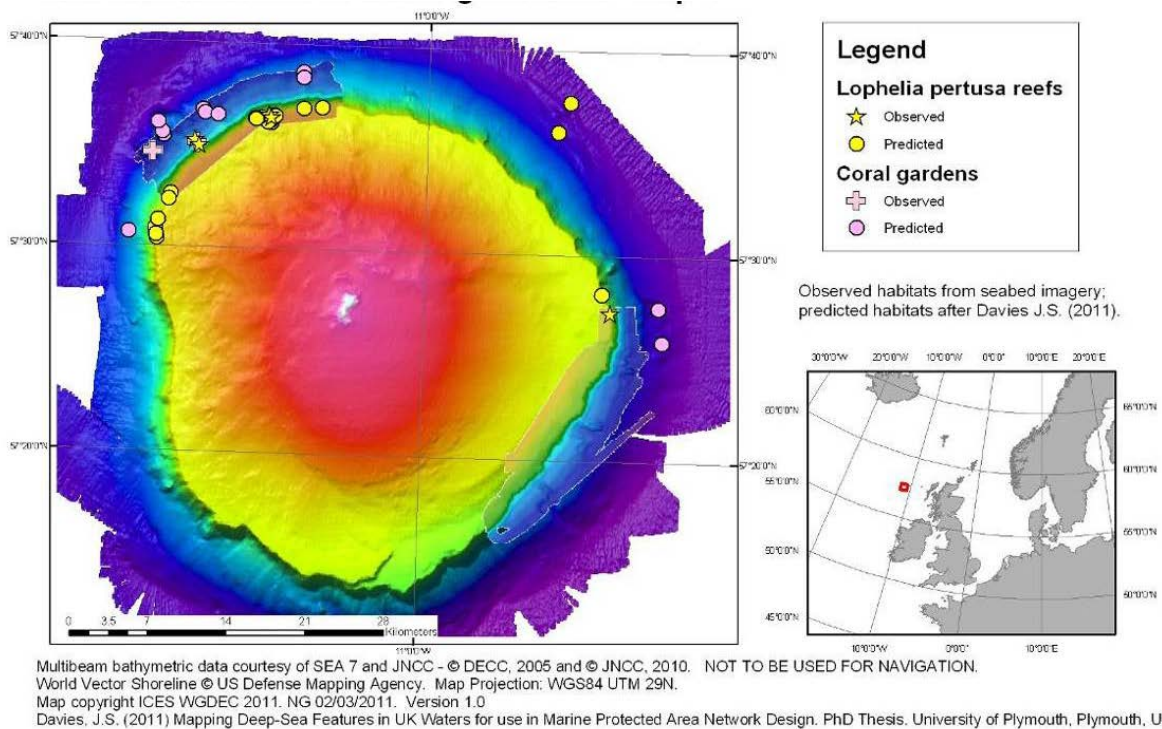
Point	Longitude	Latitude	Decimal Longitude	Decimal Latitude
1	13° 22' 25.95" W	58° 2' 49.18" N	-13.373876	58.046996
2	13° 7' 30.15" W	57° 51' 35.92" N	-13.125041	57.859977
3	13° 2' 59.41" W	57° 47' 50.44" N	-13.049835	57.797344
4	13° 2' 17.37" W	57° 43' 22.14" N	-13.038159	57.722818
5	13° 14' 55.74" W	57° 37' 15.49" N	-13.248817	57.620970
6	13° 16' 28.55" W	57° 42' 33.61" N	-13.274597	57.709336
7	13° 23' 9.04" W	57° 49' 48.98" N	-13.385845	57.830271
8	13° 43' 26.10" W	57° 56' 5.66" N	-13.723916	57.934905
9	13° 52' 28.16" W	57° 53' 37.49" N	-13.874489	57.893748
10	13° 56' 22.55" W	57° 50' 5.12" N	-13.939598	57.834757
11	14° 8' 24.02" W	57° 45' 18.44" N	-14.140004	57.755122
12	14° 19' 0.00" W	57° 29' 0.00" N	-14.316667	57.483333
13	14° 19' 0.00" W	57° 22' 0.00" N	-14.316667	57.366667
14	14° 36' 0.00" W	56° 56' 0.00" N	-14.600000	56.933333
15	14° 51' 0.00" W	56° 56' 0.00" N	-14.850000	56.933333
16	14° 39' 0.00" W	57° 6' 0.00" N	-14.650000	57.100000
17	14° 40' 0.00" W	57° 12' 0.00" N	-14.666667	57.200000
18	14° 49' 9.78" W	57° 12' 54.98" N	-14.819384	57.215272
19	14° 42' 0.00" W	57° 37' 0.00" N	-14.700000	57.616667
20	14° 28' 44.20" W	57° 50' 15.80" N	-14.478946	57.837721
21	14° 28' 25.88" W	57° 50' 42.01" N	-14.473854	57.845004
22	14° 23' 11.20" W	57° 59' 35.29" N	-14.386445	57.993137
23	14° 3' 48.86" W	58° 9' 29.55" N	-14.063572	58.158208
24	13° 53' 17.88" W	58° 13' 5.90" N	-13.888299	58.218307
25	13° 49' 41.36" W	58° 13' 43.32" N	-13.828156	58.228701
26	13° 43' 52.33" W	58° 12' 14.24" N	-13.731202	58.203954
27	13° 34' 29.10" W	58° 7' 11.72" N	-13.574750	58.119922
28	13° 22' 25.95" W	58° 2' 49.18" N	-13.373876	58.046996

## ANTON DOHRN SEAMOUNT

### New information

New information on the presence of VMEs on this seamount was available from a survey that collected multibeam echosounder data and photographic images. On the northwestern slopes of the seamount and minor volcanic cones associated with the seamount, numerous images of coral reefs and coral gardens were captured (Figure 3).

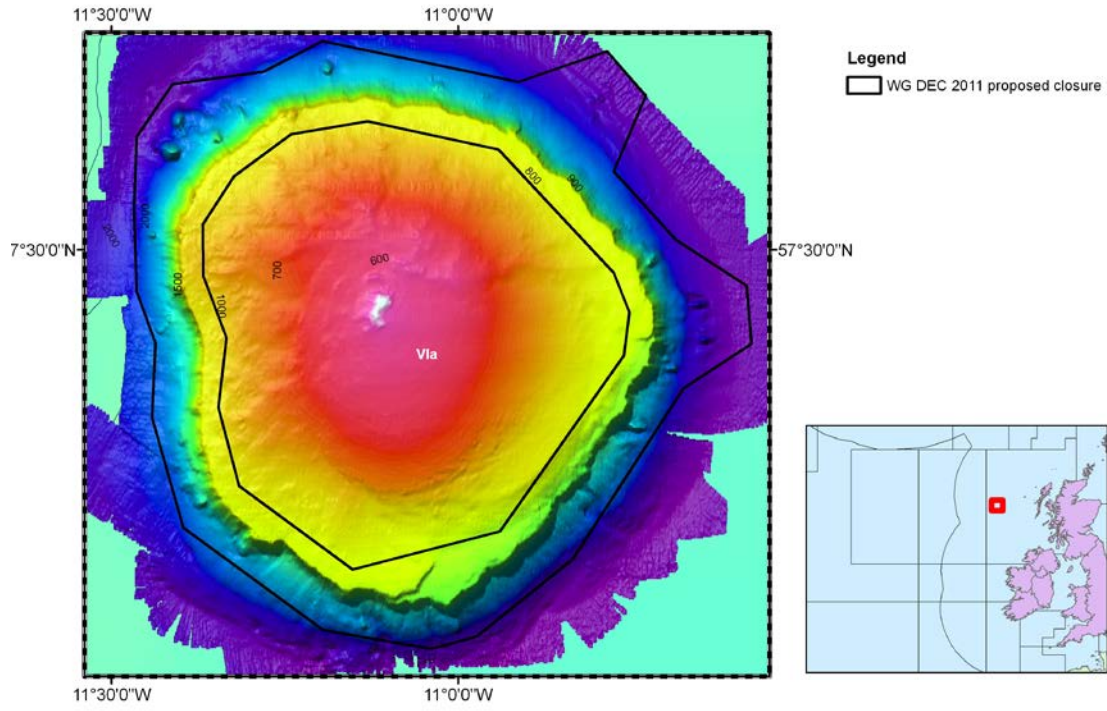
In addition to survey observations, new information from a predictive habitat model suggest VMEs are most likely to be present down the steep flanks of the seamount and especially on the minor volcanic cones and peaks at the base of the seamount (Figure 3).



**Figure 3** A composite image of the seamount constructed using multibeam data. The new observations of VMEs and modelled prediction of VME habitat are overlain.

### Closure boundaries

ICES advises that a closure of the steep flanks of this seamount be implemented due to the presence of VMEs that have not been impacted by bottom trawling. The outer extent of the proposed boundaries begins 3 km (approximately twice the water depth) beyond the foot of the seamount slope (Figure 4, Table 2). This is considered to be the minimum distance from the seamount needed to reduce the likelihood of VME damage from bottom fishing. There are extensions beyond this area to encompass minor volcanic cones. The inner extent of this boundary is approximately 2 km before the steep slopes begin (approximately twice the water depth at the break of the slope). This closure would protect the steep slopes of the entire seamount from the impacts of bottom trawling, but would leave the upper flanks and summit of the seamount vulnerable to straying trawls at depths where vessels follow contours. Past survey data indicate that the summit of this seamount, where most fishing activity is likely to take place, contains large expanses of sand and exposed bedrock and is therefore unlikely to contain high densities of VMEs.



**Figure 4** Proposed closure at the Anton Dohrn Seamount.

**Table 2**

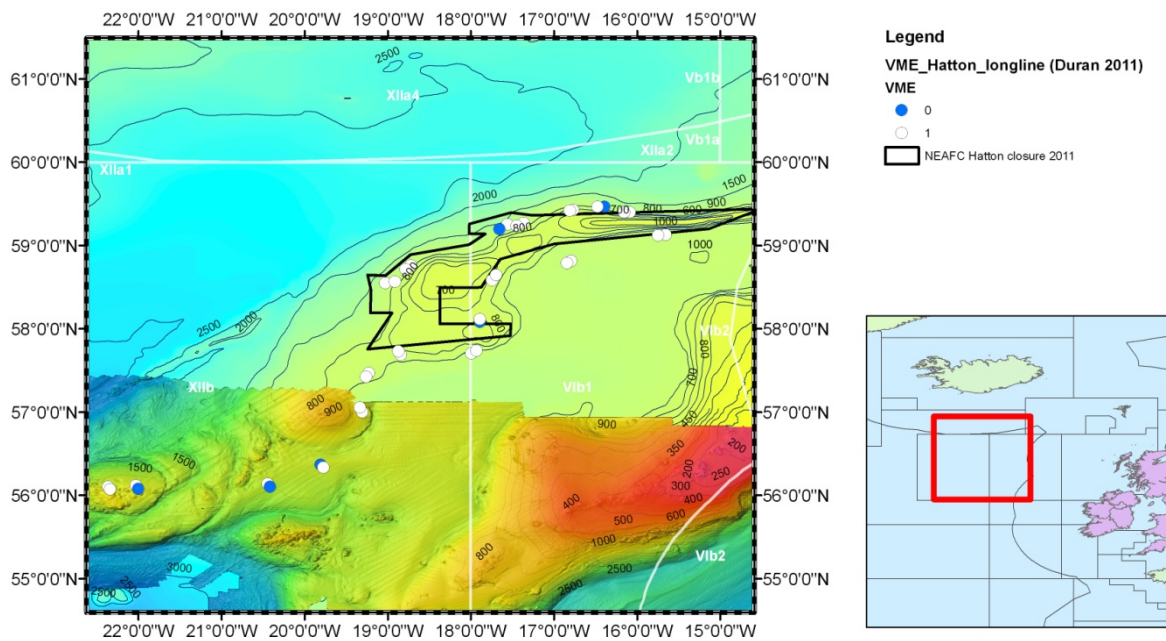
Coordinates of the proposed closure at the Anton Dohrn Seamount. Points 1–21 represent the outer boundary, points 22–35 the inner boundary.

<b>Point Number</b>	<b>Longitude</b>	<b>Latitude</b>	<b>Decimal Longitude</b>	<b>Decimal Latitude</b>
1	11° 11' 39.76" W	57° 39' 37.27" N	-11.194379	57.660353
2	10° 54' 47.60" W	57° 37' 43.16" N	-10.913223	57.628657
3	10° 47' 11.73" W	57° 39' 8.84" N	-10.786591	57.652455
4	10° 43' 42.55" W	57° 37' 8.72" N	-10.728487	57.619090
5	10° 46' 29.61" W	57° 33' 37.51" N	-10.774890	57.560421
6	10° 41' 14.64" W	57° 30' 27.51" N	-10.687401	57.507642
7	10° 35' 7.73" W	57° 28' 18.68" N	-10.585481	57.471855
8	10° 34' 35.20" W	57° 25' 30.92" N	-10.576445	57.425255
9	10° 40' 31.56" W	57° 23' 18.74" N	-10.675434	57.388539
10	10° 50' 4.11" W	57° 15' 27.77" N	-10.834475	57.257714
11	10° 58' 28.40" W	57° 11' 44.85" N	-10.974555	57.195791
12	11° 2' 18.04" W	57° 11' 15.94" N	-11.038346	57.187760
13	11° 11' 36.97" W	57° 12' 6.98" N	-11.193603	57.201938
14	11° 23' 44.46" W	57° 16' 56.89" N	-11.395685	57.282470
15	11° 26' 35.69" W	57° 21' 58.29" N	-11.443248	57.366193
16	11° 26' 4.19" W	57° 25' 29.87" N	-11.434496	57.424963
17	11° 27' 50.55" W	57° 27' 51.01" N	-11.464041	57.464170
18	11° 27' 59.11" W	57° 31' 50.63" N	-11.466420	57.530731
19	11° 27' 45.66" W	57° 35' 11.67" N	-11.462683	57.586575
20	11° 24' 36.16" W	57° 37' 33.98" N	-11.410044	57.626104
21	11° 16' 39.72" W	57° 38' 18.91" N	-11.277701	57.638586
22	11° 9' 9.09" W	57° 15' 3.61" N	-11.152525	57.251004
23	10° 56' 23.86" W	57° 16' 50.70" N	-10.939960	57.280750
24	10° 45' 37.39" W	57° 25' 0.61" N	-10.760387	57.416836
25	10° 45' 12.13" W	57° 27' 2.61" N	-10.753369	57.450726
26	10° 46' 31.75" W	57° 28' 55.44" N	-10.775487	57.482067
27	10° 56' 30.21" W	57° 34' 37.18" N	-10.941725	57.576994
28	11° 7' 47.86" W	57° 35' 57.91" N	-11.129961	57.599418
29	11° 14' 28.54" W	57° 35' 18.18" N	-11.241261	57.588384
30	11° 19' 28.90" W	57° 33' 20.97" N	-11.324695	57.555826
31	11° 22' 6.91" W	57° 31' 9.20" N	-11.368586	57.519222
32	11° 22' 1.12" W	57° 28' 37.64" N	-11.366977	57.477123
33	11° 19' 58.64" W	57° 25' 50.79" N	-11.332955	57.430774
34	11° 20' 42.29" W	57° 22' 32.45" N	-11.345080	57.375680
35	11° 18' 55.91" W	57° 18' 51.88" N	-11.315529	57.314410

## HATTON BANK

### New information

New data on VMEs in the area were made available from a longline survey (Durán Muñoz *et al.*, 2011). Data on a variety of VME indicator species such as stony corals, black corals, and gorgonians indicate the presence of VMEs across the area. Several records indicate that VME species occur just outside the northeastern and southern boundaries of the current closure (Figure 5). Further to the southwest of Hatton Bank, the survey data confirms the presence of VMEs in an area known as Edora's Bank. Multibeam data (Figure 5) also suggest that Edora's Bank has high rugosity and elevated relief, typical of carbonate mounds, reefs, or the type of seabed where VMEs are most likely to be found.



**Figure 5** The Hatton Bank area, showing the existing closure for the protection of VMEs and new data provided by Durán Muñoz *et al.* (2011), superimposed with multibeam survey data (Irish Geological Survey). The area to the far southwest corner of the map is known as Edora's Bank.

### Closure boundaries

Based on new evidence, some VMEs in the Hatton Bank region lie outside the existing closure (Figure 5). The source of this new information, however, is longline bycatch data which are considered insufficiently reliable to map VME occurrence on their own. Data from recent trawl surveys now being processed will have significant bearing on boundary modifications in the near future. ICES will seek to obtain better resolution multi-beam data and outputs of predictive habitat modelling (Davies and Guinotte, 2011). These combined sources will form a much stronger basis for advice on closures. ICES will propose a revision of the Hatton closure boundary in 2012 after these data become available.

## **REYKJANES RIDGE**

### **New information available**

Two historical (1981) observations from Russian research trawl surveys were made available in the area of the Reykjanes Ridge (northern mid-Atlantic ridge) in depths of around 1200 m. One record reports cold-water coral (species not identified) at 61.00°N 28.42°W. The other observation was a large bycatch (5 t) of sponges (species not identified) at 60°20N 29.17°W.

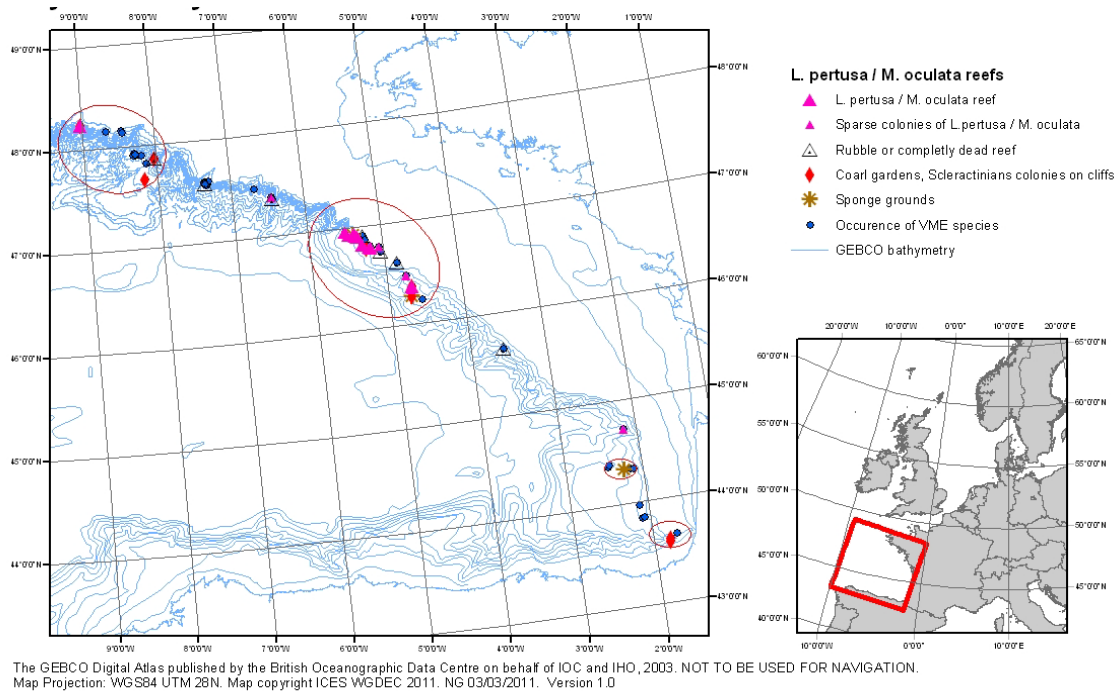
### **Closure boundaries**

As these records of VMEs are over 30 years old and one is within the northern-most closure adopted by NEAFC in 2010, ICES does not consider that there is a sufficient basis for boundary revision.

## BAY OF BISCAY

### New information

From 1996 to 2010, twelve surveys using Remotely Operated Vehicles, submersibles, or towed cameras were conducted on the canyons and the open slope of the Bay of Biscay. Various VME habitat/communities dominated by coral or sponges have been mapped (Figure 6). This includes coral reefs, composed of *Madrepora oculata* and *Lophelia pertusa*, with an associated fauna of various antipatharians, gorgonians, and hexactinellid sponges. VMEs were observed down to depths of 1100 m, but at depths above 500 m, only coral rubble was found. Trawling impacts were evident in many reefs, including in deep areas.



**Figure 6** VMEs in the Bay of Biscay. Circled areas represent the highest observed concentrations of VMEs.

### Closure boundaries

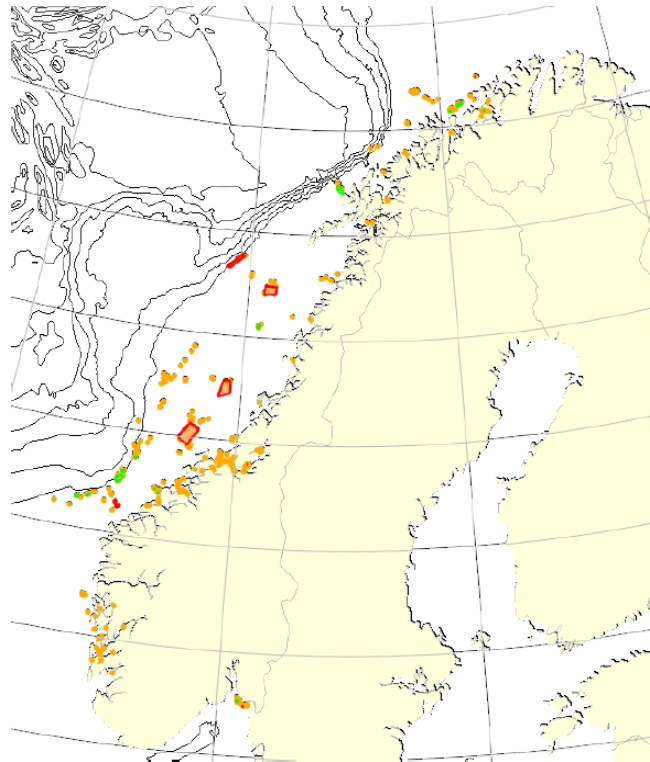
The new information indicates that the central part of the Bay of Biscay (central circled area in Figure 6) is important for VMEs and would benefit from protective measures from bottom contact fishing. As this information is currently being processed, ICES could not at this time advise on closure boundaries that would be appropriate to protect VMEs in this part of the Bay of Biscay. Provided these data and information on fishing activity become fully available in this area, ICES could consider proposing closure boundaries.

## NORWEGIAN SEA AREAS

### New information

Several new *Lophelia pertusa* reefs have been mapped, including many off northern Norway (Figure 7). The *Lophelia* reef area known as Hola or Floholmen contains clusters of around 330 individual reefs. These reefs are elongated and up to around 250 m long, with the live front of the reef facing the main direction of the current.

New information is available on both soft bottom and hard bottom coral gardens in northern Norway. This includes extensive fields of the gorgonian coral *Radicipes* at depths between 600 and 800 m in the area known as the Bjørnøya slide (71°16'N 15°40'E).



**Figure 7** Distribution of Norwegian *Lophelia pertusa* reefs. Orange dots are individual records and green dots represent areas with several reefs. Established protection areas are indicated with red polygons ([www.Mareano.no](http://www.Mareano.no)).

## Sources

- Durán Muñoz, P., Murillo, F. J., Sayago-Gil, M., Serrano, A., Laporta, M., Otero, I., and Gómez, C. 2011. Effects of deep-sea bottom longlining on the Hatton Bank fish communities and benthic ecosystem, north-east Atlantic. *Journal of the Marine Biological Association of the UK*, 91: 939–952.
- Davies, A. J., and Guinotte, J. M. 2011. Global habitat suitability for frame-work forming cold-water corals. *PLoS ONE*, 6(4), e18483, 1–15.
- ICES. 2011. Report of the ICES/NAFO Joint Working Group on Deep-water Ecology (WGDEC), 28 February–4 March, Copenhagen, Denmark. ICES CM 2011/ACOM:27. 12 pp.
- ICES 2007. ICES Advice. Report of the ICES Advisory Committees, 2007. Book 9, pp. 28–36.