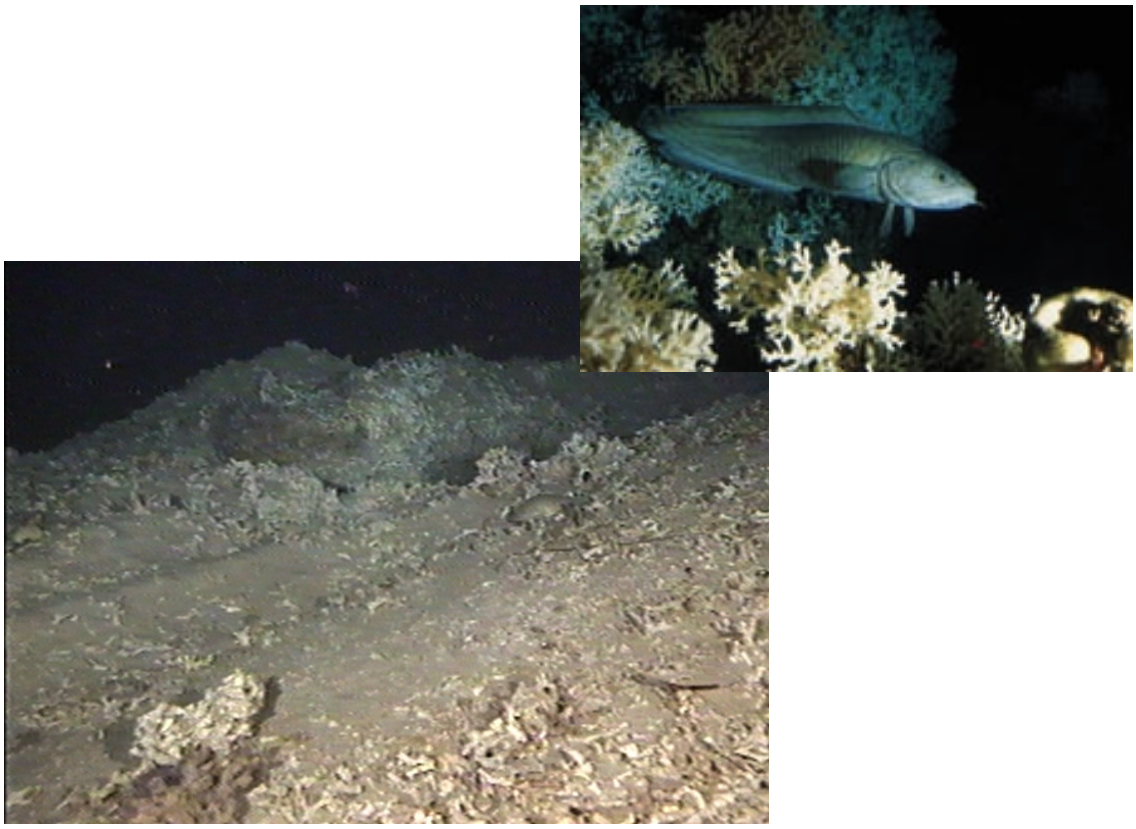
Implementation of the EU Habitats Directive Offshore: Natura 2000 sites for reefs and submerged sandbanks

Volume II: Northeast Atlantic and North Sea

A report by WWF

June 2001



Implementation of the EU Habitats Directive Offshore:
Natura 2000 sites for reefs and submerged sandbanks

A report by WWF based on:

"Habitats Directive Implementation in Europe
Offshore SACs for reefs"
by A. D. Rogers
Southampton Oceanographic Centre, UK;

and

"Submerged Sandbanks in European Shelf Waters"
by Veligrakis, A., Collins, M.B., Owrid, G. and A. Houghton
Southampton Oceanographic Centre, UK;

commissioned by WWF

For information please contact:

Dr. Sarah Jones
WWF UK
Panda House
Weyside Park
Godalming
Surrey GU7 1XR
United Kingdom

Tel +441483 412522
Fax +441483 426409
Email: sjones@wwf.org.uk

Cover page photo: Trawling smashes cold water coral reefs
P.Buhl-Mortensen, University of Bergen, Norway

Prepared by Sabine Christiansen and Sarah Jones

TABLE OF CONTENTS

ACKNOWLEDGEMENTS

WWF is grateful to a number of individuals and organisations that have contributed to the preparation of Volumes 1 to Volume 5 of this work, under considerable capacity, funding and timing constraints.

The "Reefs" work was researched and produced by Alex Rogers, Southampton Oceanographic centre (SOC), UK.

The "Submerged Sandbanks" work was written by Adonis Velegrakis, Mike Collins and Georgina Owrid, SOC. Information in the European Submerged Sandbanks Database (ESSB) was largely compiled by Alison Houghton. Admiralty Charts for compiling the ESSB were acquired from several sources, the National Oceanographic Library and the UK Hydrographic Office, Taunton are acknowledged for the provision of charts and use of their archives. A number of individuals helped in the acquisition of data and the preparation of the report, in particular Vera Van Lancker and Steven Degraer (Ghent University, Belgium) and Dorros Paphitis (SOES, Southampton). A special mention and thanks to Kate Davies (SOES), for providing the high quality illustrations and her professionalism throughout this project.

The proposals of potential SACs in the German Bight were provided by E. Rachor, Alfred Wegener Institute (AWI), Germany to the Federal Office for Nature Conservation, Vilm, Germany which submitted them to the Federal Ministry of Environment in 2000. Modified proposals are still under debate.

The "Reefs" and "Submerged Sandbanks" work was collated by Sabine Christiansen and Sarah Jones.

The introduction to the report and co-ordination of the project was undertaken by Sarah Jones WWF-UK and Sandra Jen WWF European Policy Office with help from:

Asa Anderson: WWF Sweden
Marta Ballesteros: WWF European Policy Office
Christian von Dorrien: WWF Germany
Paolo Guglielmi: WWF Mediterranean Programme
Stephan Lutter: WWF North East Atlantic Programme
Cathy Hill: WWF Sweden
Giorgos Payiatas: WWF Greece

LIST OF MAPS

LIST OF TABLES

1 INTRODUCTION

Volume II is based on two pieces of work:

"Habitats Directive Implementation in Europe: Offshore SACs for reefs"
by A. D. Rogers
Southampton Oceanographic Center, UK;

and

"Submerged Sandbanks in European Shelf Waters"
by Velegrakis, A., Collins, M.B., Owrid, G. and A. Houghton
Southampton Oceanographic Center, UK;

Volume II details offshore reefs and submerged sandbanks in the North East Atlantic and North Sea. An introduction, habitat definitions, methodology, constraints and further information about this work is described in Volume I of this series.

This analysis is a contribution by WWF to the identification of offshore Natura 2000 sites under the EU Habitats Directive[1].

It is important to note that the "reef" and "submerged sandbank" sites identified in this Volume are NOT WWF proposals for the Natura 2000 network. This ecological study identifies those sites that potentially qualify as reefs and submerged sandbanks in accordance with the Interpretation Manual and the requirements of the EU Habitats Directive, and/or require further information on their habitat characteristics. The Natura 2000 site selection process is a shared responsibility between EU Member States and the European Commission. Member States propose sites to protect habitats and species listed in the Directive. The lists are subject to a process of assessment and negotiation between the Commission and the Member States through a series of seminars. The "20%-60% rule" has acted as guideline at the seminars to assess the sufficiency of habitat representation for inclusion in the Natura 2000 network. All habitats and species that were covered to an extent higher than 60 % were considered in principle as sufficiently represented; those below a coverage of 20 % were considered, in principle, insufficiently represented. Representation of habitats and species between 20 and 60 % are discussed during the seminars and an agreement reached as to their evaluation.

[1] Council Directive 92/43/EEC on the conservation of natural habitats and of wild flora and fauna

The results in Volume II are presented in two sections.

1. The overall inventory of reefs and submerged sandbanks in the NorthEast Atlantic and North Sea in European Union Waters and adjacent waters. This inventory is a direct representation of the work by SOC scientists.

2. National inventories of reefs and submerged sandbank sites with respect to 200nm limits. (N.B. Several EU Member States have not legally declared a 200nm Exclusive Economic Zone under the United Nations Law of the Sea. National claims over the seabed of the continental shelf and fishing limits in superjacent waters vary considerably between Member States. Claims over the continental shelf can be as far as 350nm. The National inventories therefore require the input of further legal information).

2 HABITATS DIRECTIVE IMPLEMENTATION IN EUROPE: OFFSHORE SACS FOR REEFS (A. D. Rogers, SOC)

2.1 Data inventory Northeast Atlantic and North Sea

Fig. 2.1: Overview map of the Northeast Atlantic depicting sites described by the definition of "reefs" (Natura 2000 code 1170) in the Interpretation Manual of European Union Habitats (EUR 15/2).

Tab. 2.1: List of sites in the Northeast Atlantic described by the definition of "reefs" (Natura 2000 code 1170) in the Interpretation Manual of European Union Habitats (EUR 15/2). Category A: reef with good information B: bank/seamount with no information on substrate C: bank/seamount with uncertain information on substrate but most likely to be a reef D: sandbank

ID	Name	Position	Jurisd.	Categ.
1	Russer Bank	75°45' 00"N, 13°00' 00"E	Svalbard	B
2	Schulz Bank	73°52' 00"N, 07°30' 00"E	Norway	B
3	Vesteris Seamount	Centres on 73.5° N, 9.10° W (Haase & Devey, 1994)	Greenland	A
4	Louise a Boyd Bank	72° 40' 00"N, 02° 50' 00"E	High Seas	B
5	Nord Kapp Bank	72° 05' 00"N, 26° 15' 00"E	Norway	B
6	Tromsø Bank	71° 40' 00"N, 18° 00' 00"E	Norway	B
7	Myrseth Bank	71° 26' 00"N, 02° 50' 00"W	Norway	B
8	Maro Bank	71° 08' 00"N, 09° 25' 00"W	Norway	A
9	Fugloy Bank	71° 00' 00"N, 20° 00' 00"E	Norway	B
10	Eggvin Shoal	70° 54' 00"N, 12° 52' 00"W	Norway	B
11	Jan Mayen Bank	70° 00' 00"N, 09° 00' 00"W	Norway	B
12	Rost Bank	68° 25' 00"N, 12° 25' 00"E	Norway	B
13	Strede Bank	66° 50' 00"N, 28° 40' 00"W	Greenland	B
14	Traena Bank	66° 00' 00"N, 10° 00' 00"E	Norway	B
15	Dorhn	65° 55' 00"N, 29° 42' 00"W	Greenland	B
16	Sklinna Bank	65° 15' 00"N, 10° 15' 00"E	Norway	C
17	Halten Bank	64° 45' 00"N, 08° 45' 00"E. Area Approx. outlined by: 64° 56'N, 08° 08'E; 65° 01'N, 08° 41'E; 64° 42'N, 09° 14'E; 64° 25'N, 08° 56'E; 64° 28'N, 08° 11'E.	Norway	C
18	Froya Bank	63° 45' 00"N, 07° 30' 00"E. Area Approx. outlined by: 63° 52'N, 07° 18'E; 63° 46'N, 07° 40'E; 63° 39'N, 07° 12'E; 63° 46'N, 07° 06'E.	Norway	C
19	Sula Ridge	64° 06'N, 08° 00'E. Area is approx. outlined by the following co-ordinates: 64.00oN 07.8oE; 64.12oN 07.8oE; 64.00oN, 08.20oE; 64.12oN, 08.20oE	Norway	A
20	Rosengarten Bank	63° 30' 00"N, 12° 10' 00"W	Iceland	B
21	Faeroe Bank	The area is approx. outlined by the following points: 61° 00'N, 07° 44'W; 61° 36'N, 08° 56'W; 60° 44'N, 09° 34'W; 60° 26'N, 09° 20'W; 60° 28'N, 08° 40'W	Faroer Islands	A
22	Viking Bank	60° 20' 00"N, 02° 30' 00"E	Norway	B
23	Bergen Bank	60° 00' 00"N, 02° 30' 00"E	Norway	B
24	Franklin Seamount	57° 54' 00"N, 26° 30' 00"W	High Seas	B
25	Marietta Seamount	57° 02' 00"N, 28° 41' 00"W	High Seas	B
26	Hatton Bank	58° 35' 00"N, 18° 00' 00"W. Area Approx. outlined by the following co-ordinates: 56° 49'N, 19° 37'W; 58° 30'N, 19°	High Seas	C

ID	Name	Position	Jurisd.	Categ.
		00'W; 59° 26'N, 16° 45'W; 59° 15'N, 15° 52'W; 58° 45'N, 17° 15'W, 57° 52'N, 17° 45'W.		
27	Bill Bailey Bank	60° 35' 00"N, 10° 20' 00"W. Area is roughly outlined by the following points: 61° 08", 11° 33'W; 60° 49'N, 09° 44'W; 60° 22'N, 09° 38'W; 60° 11'N, 10° 16'W; 60° 19'N, 11° 05'W.	Faroe Islands	A
28	Lousy Bank, also known as the Outer Bailey	60° 25' 00"N, 12° 35' 00"W. Area Approx. outlined by the following points: 60° 49'N, 12° 55'W; 60° 25'N, 13° 55'W; 60° 03'N, 13° 55'W; 60° 03'N, 12° 00'W; 60° 52'N, 11° 49'W	Faroe Islands	A
29	Rosemary Bank	Centred on 59° 12' 00"N, 10° 15' 00"W. The area is approx. outlined by the following points: 59° 33'N, 10° 00'W; 59° 12'N, 09° 19'W; 58° 54'N, 10° 0'W; 59° 05'N, 10° 57'W.	UK	A
30	George Bligh Bank	Irregular shaped feature centring on 59° 00' N, 14° 00'W. Area is approx. outlined by the following co-ordinates: 58° 59'N, 13° 16'W; 58° 45'N, 13° 22'W; 58° 39'N, 14° 00'W; 58° 42'N, 14° 39'W; 59° 10'N, 14° 28'W; 59° 24'N, 13° 56'W.	UK	C
31	Anton Dohrn Seamount	Summit approx.: 57° 25' 00"N, 11° 10' 00"W, diameter of seamount Approx. 50km. Area outlined Approx. by the following co-ordinates: 57° 21'N, 11° 32'W; 57° 40'N, 11° 07'W; 57° 23'N, 10° 40'W; 57° 10'N, 11° 06'W.	UK	A
32	Hebrides Terrace Seamount	56° 25' 00"N, 10° 25' 00"W. Area Approx. outlined by the following co-ordinates: 56° 16'N, 10° 06'W; 56° 20'N, 10° 42'W; 56° 30'N, 10° 37'W; 56° 38'N, 10° 06'W.	UK	B
33	Edoras Bank	56° 00' 00"N, 22° 10' 00"W. Area is approx. outlined by the following co-ordinates: 55° 48'N, 23° 10'W; 56° 15'N, 22° 37'W; 56° 18'N, 21° 24'W; 55° 45'N, 22° 00'W.	High Seas	B
34	Fangorn Bank	55° 30' 00"N, 20° 10' 00"W. Area is approx. outlined by the following co-ordinates: 55° 28'N, 20° 44'W; 55° 46'N, 20° 08'W; 55° 28'N, 19° 39'W; 55° 09'N, 20° 08'N.	High Seas	B
35	Eriador Seamount	54° 50' 00"N 25° 20' 00"W. Area is approx. outlined by the following co-ordinates: 54° 10'N, 25° 47'W; 54° 28'N, 25° 47'W; 55° 04'N, 25° 23'W; 55° 00'N, 25° 10'W; 54° 12'N, 25° 26'W.	High Seas	B
36	Rohan Bank	54° 45' 00"N, 22° 20' 00"W. Area Approx. outlined by: 54° 42'N, 22° 34'W; 54° 54'N, 22° 31'W; 54° 42'N, 22° 05'W; 54° 54'N, 22° 05'W.	High Seas	B
37	Gondor Seamount	54° 15' 00"N, 23° 50' 00"W. Area is approx. outlined by the following co-ordinates: 54° 16'N, 24° 13'W; 54° 27'N, 23° 42'W; 54° 06'N, 23° 52'W.	High Seas	B
38	Isengard Ridge	52° 25' 00"N, 21° 00' 00"W	High Seas	B
39	Darwin Mounds West	Over 150 mounds in an area outlined by the following co-ordinates: 59° 49.0'N, 07° 26.75'W; 59° 49.89'N, 07° 23.87'W; 59° 49.98'N, 07° 19.49'W; 59° 47.5'N, 07° 19.49'W; 59° 47.5'N, 07° 26.75'W.	UK	A
40	"Darwin Mounds" East	Centred on 59° 52'N, 07° 05'W, depth Approx. 1,050 m (Jacobs & Masson, 2000; Bett, 2000). The area is subrectangular and outlined by co-ordinates: 59° 49' 37"N, 07° 11' 23"W; 59° 51' 31"N, 07° 11' 23"W; 59° 51' 57"N, 07° 05' 35"W; 59° 51' 08"N, 06° 58' 41"W, 59° 51' 57"N, 06° 58' 41"W.	UK	A
41	Rockall Plateau / Rockall Bank	The area is approx. outlined by the following co-ordinates: 54° 52'N, 18° 15'W; 56° 49'N, 17° 30'W; 56° 52'N, 16° 15'W; 57° 19'N, 15° 37'W; 58° 07'N, 15° 45'W; 58° 30'N, 14° 15'W; 57° 45'N, 12° 52'W; 55° 38'N, 14° 52'W.	UK/Ireland	A
42	SE Rockall Bank Reefs	Numerous reefs occurring in a band Approx. 150km long, lying between 500-1,000m depth in an area marked out by the following co-ordinates: 55° 24.18'N, 15° 51.27'W; 55° 18.37'N, 16° 50.18'W; 55° 24.75'N, 16° 51.81'W; 55° 46.5'N, 15° 08.18'W; 55° 42.75'N, 15° 03.82'W.	UK/Ireland	A

ID	Name	Position	Jurisd.	Categ.
43	Porcupine Bank	Lies between latitudes 51° - 54° N and longitudes 12° and 15oW, west of Ireland.	Ireland	A
44	North-western flank of the Porcupine Bank	Uncertain but a dredge sampled this mound between 53° 46.60'N, 13° 56.61'W (680m depth) to 53° 46.49'N, 13° 56.98'W (730m depth). Other samples included: 53° 46.55'N, 13° 56.83'W (flank of mound, 668m depth); 53° 46.54'N, 13° 56.83'W (689m depth); 53° 46.48'N, 13° 56.71'W (685m depth).	Ireland	C
45	North-western flank of the Porcupine Bank	Exact position unknown but this mound was sampled at 53° 45.39'N, 14° 00.22'W.	Ireland	C
46	North-western flank of the Porcupine Bank	Only Approx. known. This site was sampled at 53° 47.38'N, 13° 54.72'W (depth 746m).	Ireland	C
47	Northern Porcupine Seabight - Kenyon Large Mound 1 /Hovland Reef 6	Approximate but centring on Approx. 52° 13.66'N 13' 12° 34.66'W. From west to east it stretches from 12° 35.48'W to 12° 33.84'W it is uncertain how far it stretches from north to south.	Ireland	A
48	Northern Porcupine Seabight, Kenyon Large Mound Two / Hovland reef or knoll 1.	Approximate. Crest of the mound is reported to be at 52° 13.99'N, 12° 43.38 (Kenyon et al., 1998). However, this position would appear to be slightly west and to the north of the position shown in Hovland et al. (1994). The latter paper reports a smaller mound closer to the position reported by Kenyon et al. (1998), but also at a shallower depth. It appears likely that Kenyon Large Mound Two and Hovland Reef 1 are the same objects but there positions have been reported differently. It also seems likely that another mound lies Approx. 1.5km to the north of Large Mound 2 at a depth of Approx. 730m.	Ireland	A
49	Northern Porcupine Seabight, Kenyon Large Mound 3/ Hovland Knoll 3.	Approx. centres on 52° 09.1N, 12° 49.68W	Ireland	A
50	Kenyon Large Mound 4 / Hovland Knoll 4.	Reef forms an approximate triangle with the corners at 52° 10.75'N, 12° 44.28'W; 52° 09.55'N, 12° 46.08'W; 52° 07.9'N, 12° 44.4'W (measured from Hovland et al., 1994)	Ireland	A
51	Kenyon Small Mound 1	Approximate, but cored at 52° 12.73'N, 13° 02.38W (Kenyon et al., 1998). Maybe visible on Fig. 2 of Hovland et al., (1994)	Ireland	C
52	Kenyon Small Mound 2	Approximate, but a core was taken to the SE of the feature at 52° 11.94'N, 13° 02.74W (Kenyon et al., 1998).	Ireland	C
53	Kenyon Small Mound 4	Approximate, a core was taken on the feature at 52° 18.88'N, 12° 40.70'W (Kenyon et al., 1998).	Ireland	A
54	Hovland Reef 5	Centring on Approx. 52° 09.25'N, 12° 34.8'W	Ireland	C
55	Hovland Knoll No. 2	Subcircular reef Approx. centring on 52° 13.9'N, 12° 42.72'W	Ireland	A
56	Un-named reef reported in Hovland et al. (1994)	Approx. centred on 52° 13.3'N, 12° 49.2'W	Ireland	C
57	Un-named reef reported in Hovland et al. (1994)	Approx. 52° 11.5'N, 12° 50.'W	Ireland	C
58	Un-named mound from Hovland et al. (1994).	Approx. 52° 10.75' N, 12° 46.2'W	Ireland	C
59	Un-named mound shown in Fig. 3 of Hovland et al. (1994)	Approx. 52° 10.75'N, 12° 44.64'W	Ireland	C
60	Un-named mound feature shown in Fig. 3 Hovland et al (1994)	Approx. 52° 10.3'N, 12° 42.24'	Ireland	C
61	Un-named mound feature shown in Fig. 3 Hovland et al (1994)	Approx. 52° 10.75'N, 12° 41.4'W	Ireland	B
62	Un-named mound feature shown in Fig. 3 Hovland et al (1994)	Approx. 52° 09.47'N, 12° 33.36'W'	Ireland	C

ID	Name	Position	Jurisd.	Categ.
63	Hovland un-named knoll	52° 13.8'N, 12° 55.9'W	Ireland	B
64	Hovland un-named knoll	52° 19'N, 13° 00'W	Ireland	B
65	Hovland un-named knoll	52° 17.4'N, 13° 01.3'W	Ireland	B
66	Hovland un-named knoll	52° 15.8'N, 13° 02.6'W	Ireland	B
67	Hovland un-named knoll	52° 15.0'N, 13° 02.6'W	Ireland	C
68	Hovland un-named knoll	52° 15.8'N, 13° 03.9'W	Ireland	B
69	Hovland un-named knoll	52° 19.7'N, 12° 31.2'W	Ireland	B
70	Hovland un-named knoll	52° 15.8'N, 12° 13'W	Ireland	B
71	Hovland un-named knoll	52° 14.2'N, 12° 13'W	Ireland	B
72	Hovland un-named knoll	52° 14.2'N, 12° 19.5'W	Ireland	B
73	Hovland un-named knoll	52° 15.0'N, 12° 19.5'W	Ireland	B
73-1	Kenyon Small Mound 3	Approximate, a core was taken near the base of the feature at 52° 19.19'N, 12° 59.07'W (Kenyon et al., 1998). Maybe visible on Fig. 2 of Hovland et al., (1994).	Ireland	C
74	Magellan Reefs	These reefs are located in an area outlined by the following approximate co-ordinates. 52° 13.6'N, 13° 09.2'W; 52° 35.4'N, 12° 39.1'W; 52° 31.4'N, 12° 17.2'W; 52° 16.3'N, 12° 18.4'W; 52° 16.3'N, 12° 48.3'W; 52° 09.5'N, 13° 00'W (calculated from Fig 1b in Henriet et al., 1998).	Ireland	C
75	Eastern Porcupine Seabight Coral Reefs/ Mounds Area	Area centred on point at 51° 28' 25" N, 11° 42' 55" W, depth Approx. 850m. The area is outlined by an irregular rectangle with following points at corners: 51° 17' 01"N, 11° 42' 30"W; 51° 38' 25"N, 11° 51' 15"W; 51° 40' 11"N, 11° 41' 40"W; 51° 18' 04"N, 11° 36' 00"W.	Ireland	C
76	Eastern Porcupine Seabight	Approx. centred on 51° 38' 25"N, 11° 46' 23"W, depth Approx. 750 m.	Ireland	C
77	Eastern Porcupine Seabight	Approx. centred on 51° 36' 29"N, 11° 49'10"W, depth Approx. 750 - 800 m.	Ireland	B
78	Eastern Porcupine Seabight	Approx. centred on 51° 35' 21"N, 11° 47' 13"W, depth Approx. 850 m.	Ireland	B
79	Eastern Porcupine Seabight	Approx. centred on 51° 35' 26"N, 11° 43' 20"W, depth Approx. 700-800 m.	Ireland	B
80	Eastern Porcupine Seabight	Approx. centred on 51° 34' 34" N, 11° 41' 07" W, depth Approx. 950 m.	Ireland	B
81	Eastern Porcupine Seabight	Approx. centred on 51° 33' 31"N, 11° 40' 58" W, depth Approx. 850 m.	Ireland	B
82	Eastern Porcupine Seabight	Approx. centred on 51° 33' 52"N, 11° 43' 37 "W, depth Approx. 800-850 m.	Ireland	C
83	Eastern Porcupine Seabight	Approx. centred on 51° 32' 59"N, 11° 43' 45 "W, depth Approx. 850 m.	Ireland	C
84	Eastern Porcupine Seabight	Approx. centred on 51° 32' 48"N, 11° 41' 15 "W, depth Approx. 750 m.	Ireland	C
85	Eastern Porcupine Seabight (AT24Gr)	Approx. centred on 51° 28' 57"N, 11° 41' 23 "W, depth Approx. 800 m.	Ireland	C
86	Eastern Porcupine Seabight	Approx. centred on 51° 25' 37"N, 11° 43' 53 "W, depth Approx. 900 m.	Ireland	B
87	Eastern Porcupine Seabight	Approx. centred on 51° 24' 07"N, 11° 44' 18 "W, depth Approx. 950 m.	Ireland	B
88	Eastern Porcupine Seabight (AT34, 35, 36?)	Approx. centred on 51° 23' 52"N, 11° 40' 50 "W, depth Approx. 650-800 m.	Ireland	C

ID	Name	Position	Jurisd.	Categ.
89	Eastern Porcupine Seabight	Approx. centred on 51° 24' 55"N, 11° 38' 53 "W, depth Approx. 600 m.	Ireland	C
90	Eastern Porcupine Seabight	Approx. centred on 51° 22' 38"N, 11° 40' 33 "W, depth Approx. 700-800 m.	Ireland	B
91	Eastern Porcupine Seabight	Approx. centred on 51° 21' 40"N, 11° 40' 50" W, depth Approx. 700-800 m.	Ireland	B
92	Eastern Porcupine Seabight	Approx. centred on 51° 18' 46"N, 11° 40' 50" W, depth Approx. 800-1,000 m.	Ireland	B
93	Teresa Reef (previously mud volcano Teresa)	Circular area centring on 51° 25.6'N, 11° 46.26W	Ireland	A
94	Belgica Reefs	Unpublished and probably not completely surveyed. At least part of this reef-system lies within a box marked by the following points: 51° 15.4'N, 11° 30'W; 51° 15.4' N, 11° 52.8'W; 51° 19.3'N, 11° 52.8'W; 51° 19.'N, 11° 30'W (from Kenyon et al., 1998).	Ireland	B
95	Olympus Knoll	45° 25' 00"N 27° 40' 00"W	High Seas	B
96	Gascogne Knoll	45° 23' 00"N, 05° 21' 00"W	Spain and France	C
97	Jovellanos Seamount	44° 28' 00"N, 04° 15' 00"W	Spain	B
98	Le Danois Bank	44° 05' 00"N, 05° 06' 00"W	Spain	A
99	Charcot Seamounts	44° 50' 00"N, 13° 00' 00"W	Spain	B
100	Antialtair Seamount	43° 35' 00"N, 22° 25' 00"W	High Seas	B
104	Chaucer Seamount	42° 50'00"N, 28° 55' 00"W	High Seas	B
105	Hurd Bank	50° 45' 11° 20'W (Le Danois, 1948)	Ireland	C
106	Great Sole Bank	Not given	Ireland	C
107	La Chapelle Bank	Western area Approx.: 47° 40'N, 08° 00'W; 47° 53'N; 07° 30'W; 47° 49,N, 08° 14'W; 48° 00'N, 08° 00'W. Eastern area Approx. outlined by: 47° 49'N, 07° 26'W; 47° 41'N, 07° 38'W; 47° 33'N, 07° 38'W; 47° 27'N, 07° 07'W; 47° 44'N, 07° 12'W.	France	A
108	Grand Vasiére	Along the continental slope from 45° 30'N, 03° 50'W - 47° 15'N, 05° 50'W	France	C
109	Galicia Shelf East	The area is outlined by the following approximate co-ordinates: 44° 00'N, 07° 00'W; 44° 11'N, 07° 04'W; 44° 11'N, 07° 07'W; 44° 02'N, 07° 14'W.	Spain	C
110	Galicia Shelf West	Extent of area not fully surveyed. Approximate positions given in Le Danois (1948) were: 43° 42'N, 09° 00'W; 43° 50'N, 09° 09'W; 43° 37'N; 09° 24'W; 43° 20'N, 09° 42'W; 43° 08'N, 09° 37'W; 43° 28'N, 09° 16'W.	Spain	A
111	Galicia Bank	42° 35' 00"N, 11° 35' 00"W. The shallow parts of the bank are outlined by the following co-ordinates: 43° 16'N, 11° 41'W; 43° 13'N, 12° 06'W; 42° 55'N, 12° 11'W; 42° 40'N, 12° 14'W; 42° 22'N, 12° 00'W; 42° 28'N; 11° 34'W; 42° 35'N, 11° 25'W. The total area is approx. outlined by the following co-ordinates: 42° 03'N, 10° 49'W; 42° 39'N, 10° 28'W; 43° 44'N, 11° 00'W; 43° 18'N, 12° 16'W; 42° 22'N, 13° 00'W; 42° 08'N, 12° 13'W.	Spain	A
112	Vasco da Gama Seamount	41° 00'N, 11° 22'W. Area is approx. outlined by the following points: 40° 45'N, 11° 20'W; 41° 00'N, 11° 18'W; 41° 00'N, 11° 27'W; 41° 07'N, 11° 23'W.	Portugal	C
113	Vigo Seamount	41° 19'N, 10° 40'W. Area is approx. outlined by the following co-ordinates: 41° 33'N, 10° 31'W; 41° 31'N, 10° 38'W; 41° 18'N, 10° 43'W; 41° 13'N, 10° 54'W; 41° 06'N, 10° 47'W; 41° 08'N, 10° 35'W; 41° 20'N, 10° 30'W.	Portugal	C
124	Sedlo Seamount	40° 25' 00"N, 26° 55' 00"W	Portugal/ Azores	B
158	Azores Bank	Approx. 38° 09'N, 29° 00'W	Azores/ Portugal	B
159	Ashton Seamount	38° 00' 00"N, 13° 20' 00"W	Portugal	B
170	Princess Alice Bank	38° 05'00"N, 29° 15'00"W	Azores/ Portugal	A
171	Joao de Castro Bank	38° 13'N, 26° 38'W	Azores/	A

ID	Name	Position	Jurisd.	Categ.
			Portugal	
176	Tore Seamount	Approx. centred on: 39° 24'N, 12° 51'W. Area Approx. outlined by: 38° 33'N, 13° 21'W; 38° 42'N, 13° 44'W; 39° 09'N, 14° 11'W; 39° 29'N, 13° 44'W; 39° 55'N, 13° 07'W; 39° 47'N, 12° 21'W; 39° 53'N, 11° 51'W; 39° 13'N, 11° 57'W, 38° 38'N, 12° 37'W.	Portugal	A
177	Gorringe Ridge	36° 35' 00"N, 11° 25' 00"W. Area above 2000m depth outlined by the following co-ordinates: 37° 01'N, 10° 46'W; 36° 37'N, 10° 56'W; 36° 17'N, 11° 37'W; 36° 11'N, 11° 57'W; 36° 27'N, 12° 03'W; 36° 33'N, 12° 04'W; 36° 47'N, 11° 36'W.	Portugal	A
178	Josephine Bank	36° 35' 00"N, 14° 15' 00"W. The boundaries of this seamount are difficult to determine but the seamount is approx. outlined by the following co-ordinates: 36° 30'N, 14° 13'W; 36° 38'N, 14° 24'W; 36° 46'N, 14° 40'W; 37° 04'N, 14° 28'W; 36° 53'N, 14° 13'W; 36° 44'N, 14° 04'W (estimated from map in Hesthagen, 1970).	High Seas	A
180	Gettysberg Seamount	36° 30'00"N, 13° 00'00"W	Portugal	A
199	Ampere Seamount	35° 05'00"N, 12° 55'00"W. Area outlined by the following co-ordinates: 34° 46'N, 13° 32'W; 35° 04'N, 13° 32'W; 34° 53'N, 12° 41'W; 35° 18'N, 12° 46'W (from map in Peirce & Barton, 1991 - Note that labels for Latitude on Fig 1a in this paper are out by 1o)	Portugal	A
200	Lion Bank or Seamount	35° 15' 00"N, 15° 35'00"W. Area outlined by the following co-ordinates: 35° 00'N, 15° 48'W; 35° 25'N, 15° 51'W; 35° 29'N, 15° 11'W; 35° 05'N, 15° 07'W.	Portugal	C
201	Coral Patch Bank or Coral Patch Seamount	34° 56'00"N, 11° 57'00"W: Area Approx. outlined by the following co-ordinates: 34° 54'N, 12° 28'N; 35° 07'N, 12° 21'W; 35° 18'N, 11° 02'W; 34° 49'N, 11° 25'W; 34° 40'N, 12° 00'W.	Portugal	C
202	Dragon Bank or Dragon Seamount	34° 55'00"N, 16° 30'00"W. Area Approx. outlined by the following co-ordinates: 34° 18'N, 17° 09'W; 35° 13'N, 16° 00'W; 35° 40'N, 16° 18'W; 35° 18'N, 16° 00'W; 34° 42'N, 16° 16'W.	Portugal	C
208	Unicorn Bank	34° 45'00"N, 14° 30'00"W. Area Approx. outlined by the following co-ordinates: 34° 22'N, 14° 44'W; 35° 05'N, 14° 35'W; 34° 38'N, 14° 07'W.	Portugal	C
213	Seine Seamount	33° 50'00"N, 14° 20'00"W. Area Approx. outlined by the following co-ordinates: 33° 29'N, 14° 44'W; 33° 47'N, 14° 44'W; 34° 04'N, 14° 12'W; 33° 47'N, 14° 05'W; 33° 32'N, 14° 12'W.	Portugal	A
217	Dacia Bank	31° 10'00"N 13° 35'00"W	Spain	B
218	Un-named	30° 00'48"N, 15° 55'26"W		
219	Conception Bank	29° 55' 00"N, 12° 45' 00"W	Spain	
220	The Gaps Seamounts (Non EU?)	25° 55'00"N, 20° 25'00"W		
221	Saharan Seamounts	25° 30' 00"N, 20° W		
222	Endeavour Bank (Non EU?)	25° 20'00"N, 19° 20'00"W		
223	Tropic Seamount (Non-EU?)	23° 50' 00"N, 20° 40'00"W		
224	Great Fisher Bank	56° 40' 00"N, 04° 15' 00"E	Norway	A
225	Dogger Bank	54° 50' 00"N, 02° 20' 00"E. Area Approx. outlined by the following co-ordinates: 54° 36'N, 01° 11'E; 55° 03'N, 01° 14'E; 56° 00'N, 05° 09'E; 55° 24'N, 04° 48'E; 54° 20'N, 02° 59'E; 54° 06'N, 01° 47'E.	UK/NL/GER	D

2.2 Example cases for the type of information provided (full list see Vol. IV)

In this section, the environmental characteristics of 4 reefs are presented in more detail, information gained mainly from published scientific literature. The 4 reefs chosen were: "Darwin Mounds" East (UK), Galicia Bank (Spain), Gorringe Ridge (Portugal) and La Chapelle Bank (France). The features of these reefs are rather well-known, compared to most others.

2.2.1 "Darwin Mounds" East (UK)

Site name	**"Darwin Mounds" East**
ID	40
Position	Centred on 59° 52'N, 07° 05'W, depth Approx. 1,050 m (Jacobs & Masson, 2000; Bett, 2000). The area is subrectangular and outlined by co-ordinates: 59° 49' 37"N, 07° 11' 23"W; 59° 51' 31"N, 07° 11' 23"W; 59° 51' 57"N, 07° 05' 35"W; 59° 51' 08"N, 06° 58' 41"W, 59° 51' 57"N, 06° 58' 41"W.
Jurisdiction	UK
Site Area	Approx. 10km^2
Site Classification	Reef
Extent of Habitat	Uncertain as not all the mounds have been surveyed to ascertain the presence of corals. Probably Category B. Approx. 5-10% including mound tails.
Description	This site represents an extension of the original "Darwin Mounds" area and is similar to the former site in a number of ways. There are Approx. 80 mounds and they are described by Jacobs & Masson (2000) as small sub-circular mounds, typically 50-100m in diameter and reaching a height of 5m. The mounds also exhibit tails that extend towards the south-west of the mounds for a distance of several hundred meters. These are detected as areas of high backscatter on acoustic images taken by the TOBI instrument. Bett (2000) indicates that these mounds and the associated tails are similar to the "Darwin Mounds" in that *Lophelia pertusa* is located on the tops of the mounds and high densities of xenophyophores are found on the mound tails. However, No specific studies of the fauna associated with this site have been reported as yet. The area in which the "Darwin Mounds" East are found has a higher density of rocks on the seabed than the Darwin mounds. However, the corals do not seem to be associated with these rocks. Like the Darwin Mounds the Darwin Mounds East site is located at the base of the slope of the Wylville-Thomson Ridge. It is likely that the current flow in this region is redirected at depth by topography to flow towards the west and the area may also be influenced by cold water overflow from the Faeroes Shetland-Channel. However the deep-water hydrography in this area is poorly studied.
Representation of Habitat	Category A. This is the second site consisting of reefs with a mound morphology with coral on top and with tails of high acoustic backscatter. Another site located within the Rockall Trough may be similar but has not been thoroughly investigated. It is also the second confirmed *Lophelia pertusa* reef-site in UK waters, known to date. As such the area is highly representative of tailed-mound reefs and should be designated as a SAC along with the "Darwin Mounds".
Conservation Status	No specific protection, though fisheries in the area are managed according to the EU fisheries policy. It is unknown whether this area has been impacted by trawling or other industrial activities, though it would seem to be more or less

	intact. Deep-sea fishing is probably the most significant imminent threat to this site, though the possible impacts of future oil and gas exploration and production in the area are unknown (Rogers, 1999).
Global Importance	Category A. Highly significant as it is only one of two confirmed tailed-mound reefs.
Associated Species	
Category	A

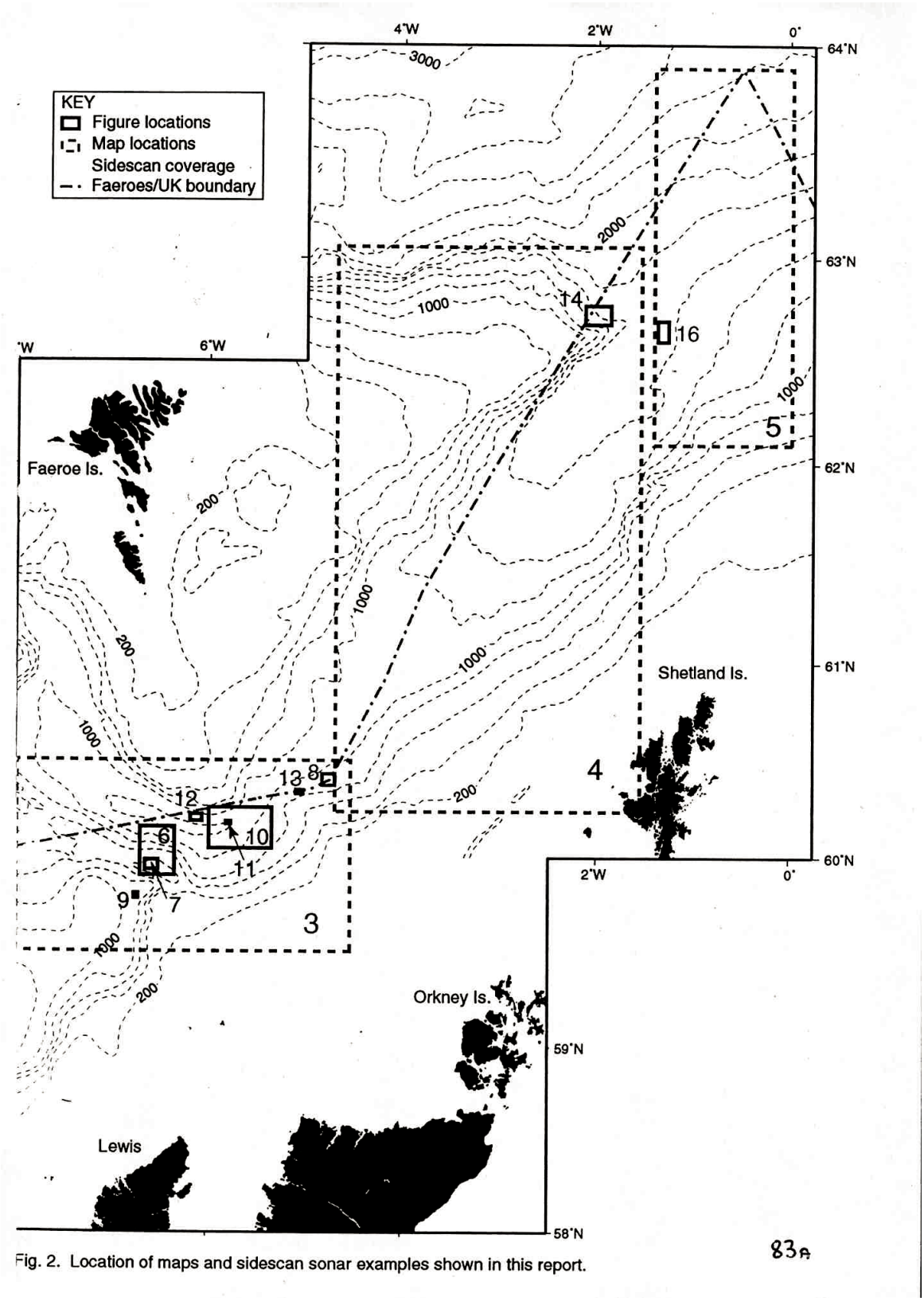


Fig. 2. Location of maps and sidescan sonar examples shown in this report.

Fig. 2.2.1.1: Location of maps and side scan sonars

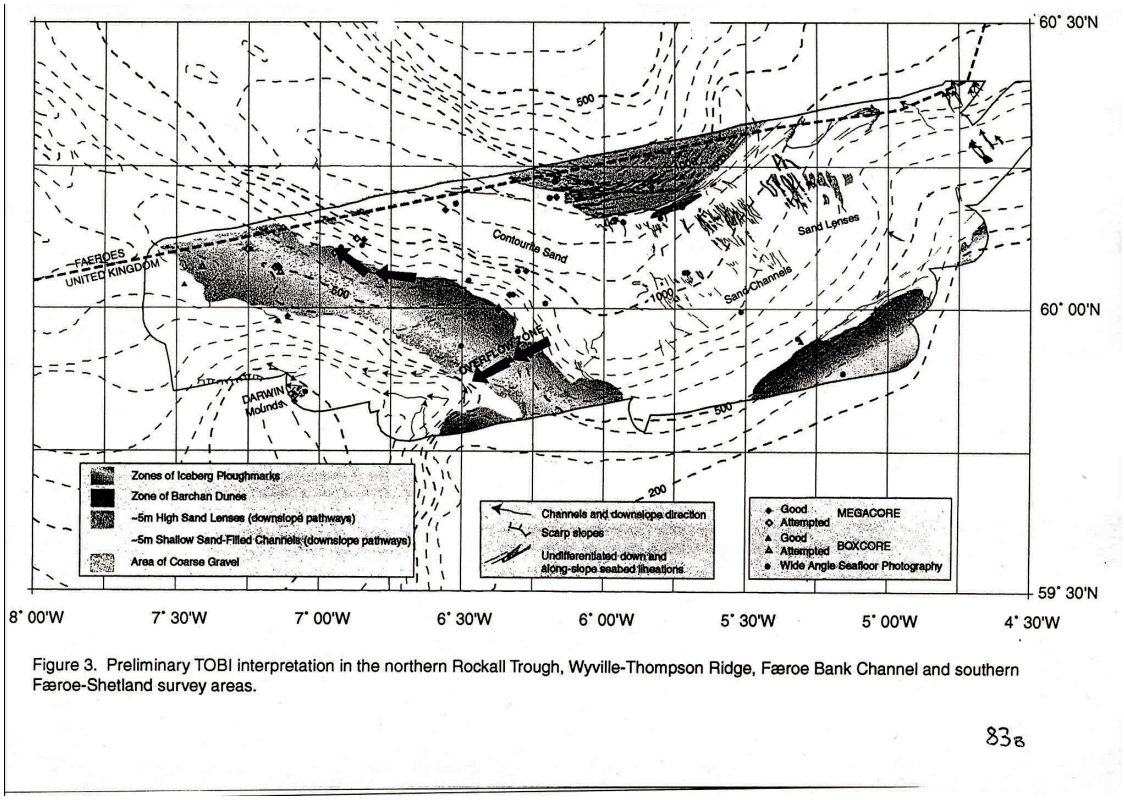


Figure 3. Preliminary TOBI interpretation in the northern Rockall Trough, Wyville-Thompson Ridge, Færoe Bank Channel and southern Færoe-Shetland survey areas.

83a

Fig. 2.2.1.2: Preliminary TOBI interpretations in the northern Rockall Trough, Faroe Bank Channel and southern Faroe Shetland survey areas.

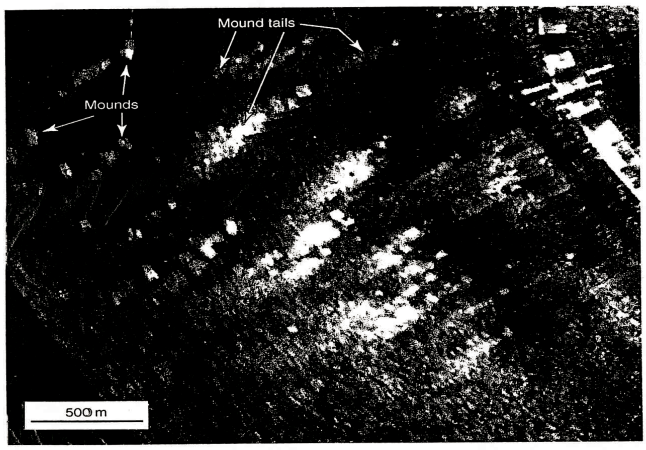


Fig. 9. TOBI image showing the field of carbonate mounds in the northernmost part of the Rockall Trough. This is an extension of the 'Darwin' mound field previously discovered during the AFEN survey in 1998. Note typical mound structure of a high-backscatter sub-circular target with a 'tail' directed towards the southwest. See figure 2 for location.

83c.

Fig. 2.2.1.3: TOBI image showing the field of carbon mounds in the northernmost part of the Rockall Trough.

2.2.2 Galicia Bank (Spain)

Site name	**Galicia Bank**
ID	111
Position	42° 35' 00"N, 11° 35' 00"W. The shallow parts of the bank are outlined by the following co-ordinates: 43° 16'N, 11° 41'W; 43° 13'N, 12° 06'W; 42° 55'N, 12° 11'W; 42° 40'N, 12° 14'W; 42° 22'N, 12° 00'W; 42° 28'N; 11° 34'W; 42° 35'N, 11° 25'W. The total area is approx. outlined by the following co-ordinates: 42° 03'N, 10° 49'W; 42° 39'N, 10° 28'W; 43° 44'N, 11° 00'W; 43° 18'N, 12° 16'W; 42° 22'N, 13° 00'W; 42° 08'N, 12° 13'W.
Jurisdiction	Spain
Site Area	Entire bank Approx. 17,000km2. Shallow part of bank Approx. 6,250 km2
Site Classification	Reef (Seamount)
Extent of Habitat	Unknown but there are large areas of exposed hard substrates on the steep-slopes of this seamount. Provisionally Category A.
Description	The Galicia Bank is located Approx. 200km west of the coast of Galicia, NW Spain. It is separated from the continental shelf by a channel that is between 2,500m and 3,000m deep. The bank is irregular in outline and determination of the area the bank covers is difficult. The bank comes to within about 600m of the surface and slopes very steeply in the north and north-west from Approx. 1,000m depth to the abyssal plain at 5,000m. Large areas of the bank appear to be composed of exposed basaltic larvas (Malod et al., 1993) and at least part of the bank is composed of uplifted oceanic crust. The biology of the Galicia Bank is largely unstudied. The area was not mentioned by Le Danois (1948) wh° concentrated on occurrences of *Lophelia pertusa* off the shelf break and on the continental slope. Photographs in Malod et al. (1993) show the occurrence of gorgonians or stylasterids on basaltic rocks at over 4,000m depth. Tyler & Zibrowius (1992) report that submersible dives have taken place on the western slopes of the Galicia Bank and reported on some of the animals present including a strange, unrecognised partially transparent sessile animal. The Galicia Bank is clearly in need of further biological survey work.
Representation of Habitat	The Galicia Bank represents a large seamount with an abundance of hard substrates. I place it in Category A as a non-biogenic reef.
Conservation Status	Unknown. It is assumed that this area is subject to deep-water or pinnacle fishing either by trawl or long line. Whether such activities have damaged the fauna inhabiting the Galicia Bank is unknown. Fauna located on the deeper parts of the Bank are less likely to have been influenced by such activities.
Global Importance	An important site regionally but global importance is difficult to ascertain without further biological data. Category A or B.

Associated Species

Cnidaria, Hydroidea

Halecium sibogae marocanum (Ramil et al., 1998; 42º 41.6'N, 11º 48.5'W, 765m)

Kichenpaueria pinnata (Ramil et al., 1998; 42º 41.6'N, 11º 48.5'W, 765m)

Cladocarpus elongatus (Ramil et al., 1998; 42º 50.9'N, 11º 53.1'W, 1110-1125m)

Schizotrocha frutescens (Ramil et al., 1998; 42º 43.4'N, 11º 45.1'W, 770m)

Actinaria

Actinoscyphia saginata (misidentified by Boillot, 1987 as Phelliactis robusta – see Tyler & Zibrowius, 1992)

Unidentified animal

An unusual organism attached to rocks that is completely transparent and resembled a large bubble. It is several cm in diameter and is wider than high. It is possibly an extremely unusual brachiopod but its actual identity remains an enigma. It has been observed at 3000m and 4360m off the Galicia Bank and on the Goban Spur at 2834m and 2993m. (Tyler & Zibrowius, 1992).

Category

A

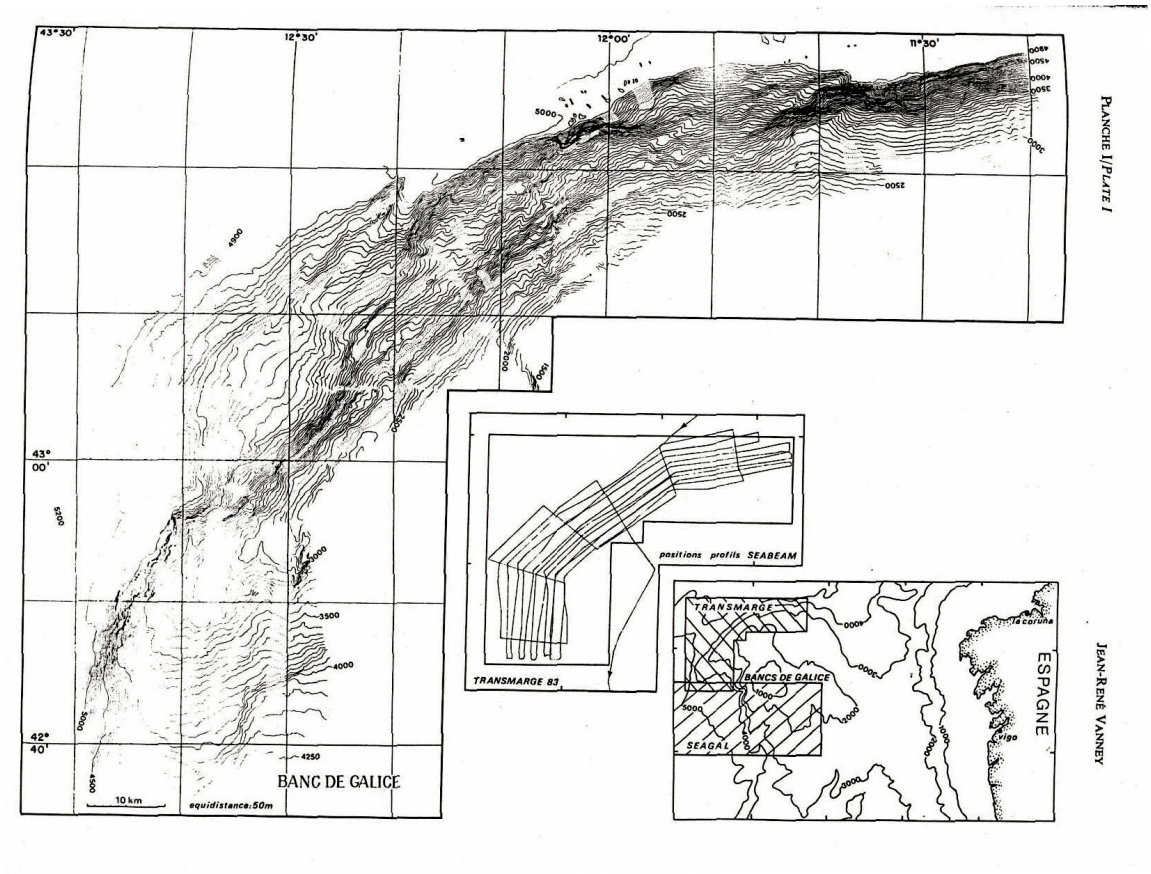


Fig. 2.2.2.1: Galicia Bank, bathymetry.

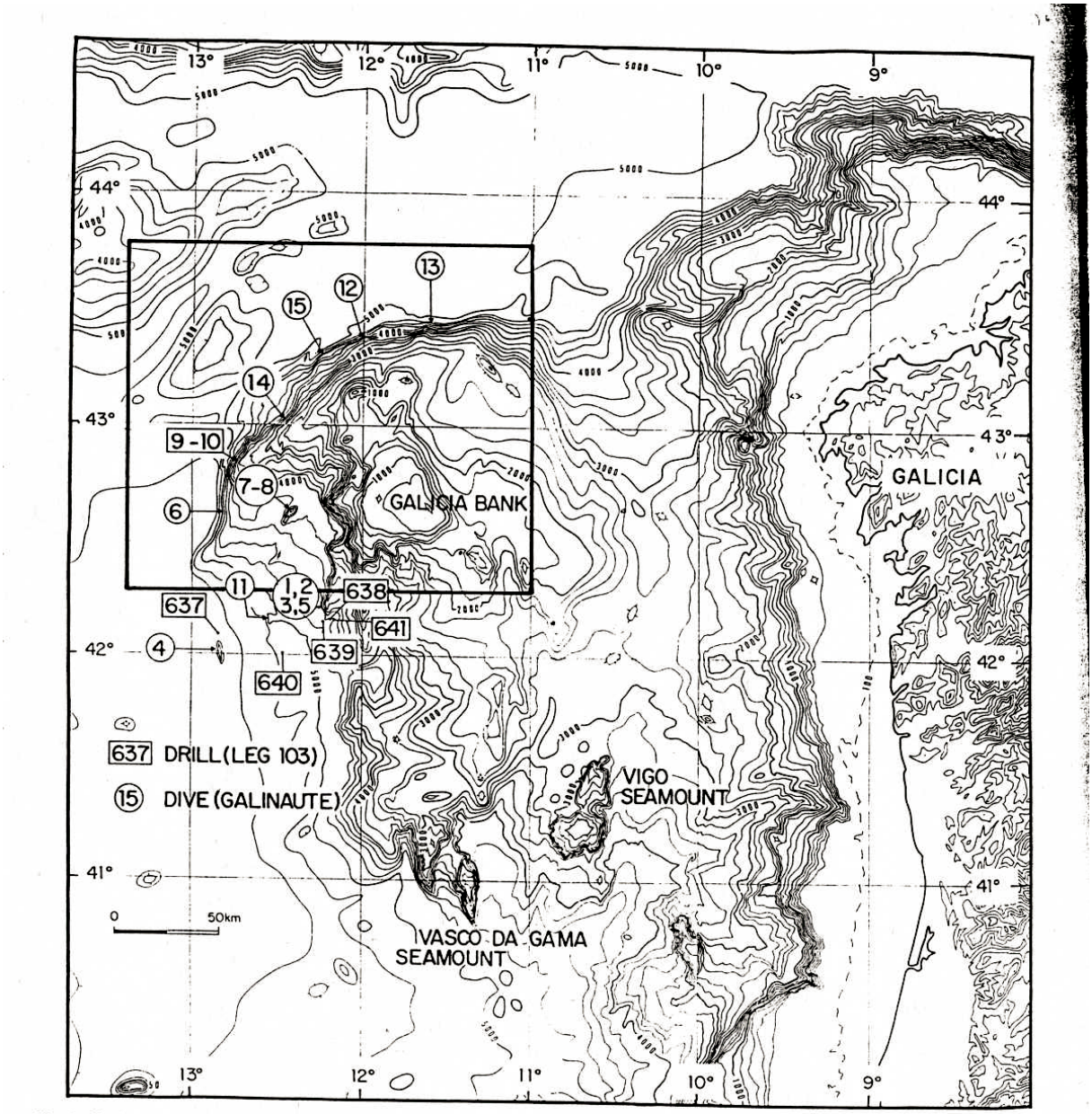


Fig. 1. Bathymetry of the Galicia Bank margin (Lallemand et al., 1985). The Nautile's dives and ODP Leg 103 drills are shown. Basaltic sea floor was sampled at dive sites 12, 13 and 15. Outlined area is the study area.

Fig. 2.2.2.2: Bathymetry of the Galicia Bank margin.

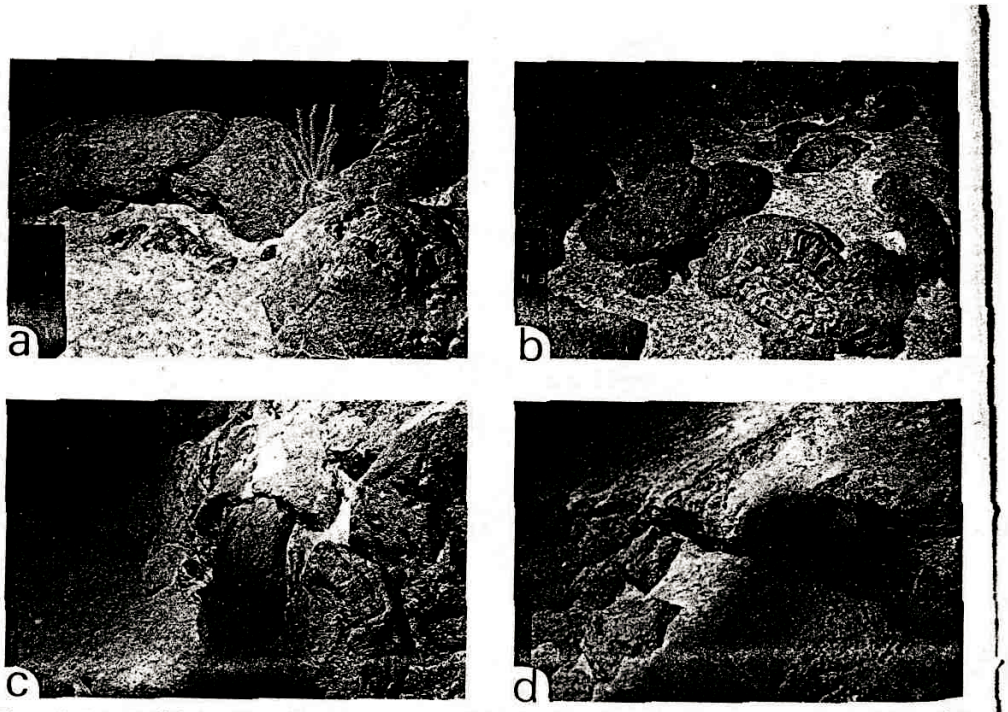


Fig. 3. Photographs of the basaltic seafloor taken during dive 15. (a) Top of lava flow with tubes and pillows, 4444 m. (b) Lava flow surface with radial structures of a tube, 4645 m. (c) Lava flow edge with tubular forms, 4667 m. (d) Scarp of a massive lava flow, 4662 m. The horizontal field of view is about 3 m.

Fig. 2.2.2.3: Photographs of the basaltic seafloor at the Galicia Bank.

2.2.3 Gorringe Ridge (Portugal)

Site name	**Gorringe Ridge**
ID	177
Position	36° 35' 00"N, 11° 25' 00"W. Area above 2000m depth outlined by the following co-ordinates: 37° 01'N, 10° 46'W; 36° 37'N, 10° 56'W; 36° 17'N, 11° 37'W; 36° 11'N, 11° 57'W; 36° 27'N, 12° 03'W; 36° 33'N, 12° 04'W; 36° 47'N, 11° 36'W.
Jurisdiction	Portugal
Site Area	9,500km2
Site Classification	Reef (Seamount)
Extent of Habitat	Large areas of exposed hard substrates. Category A.
Description	A large seamount that arises from nearly 5,000m depth on the northern side to peaks of Approx. 20-28m depth (Gettysberg peak), and 33-46 m depth (Ormonde peak). Note that Gettysberg and Ormonde are often referred to individually as Seamounts but they form part of the same structure. Sometimes a western extension of this bank is also referred to as the Hirondelle II Seamount (not the same as the Hirondelle Seamount). The surface of the seamount is composed of recent conglomerates and larva flows with some areas of exposed carbonate rock (Girardeau et al., 1998). To the south of the Gorringe Bank lies the Horseshoe Abyssal plain, which is mainly made up of turbidite sediments (Lebreiro et al., 1997). The seamount presents a topographic barrier to the flow of Meddies (closed rotating bodies of Mediterranean water) and tends to deflect them to the west (Bower et al., 1995). Little is known about the biology of the Gorringe Bank but it appears to have the typical characteristics of a large seamount. There is a diverse sessile fauna composed of filter feeders such as hydroids, gorgonians and corals. These are hard substrate specialists. The seamount would also appear to be important for fish populations, especially large pelagic species and those that are usually associated with underwater topographic highs.
Representation of Habitat	This is a large and important seamount located off the coast of Portugal. The fauna of the seamount has not been well studied but there are important populations of sessile filter feeding animals and other deep-water specialist colonisers of hard substrates. The seamount probably hosts important populations of commercially valuable fish. Category A.
Conservation Status	Unknown. This site has probably been targeted by deep-water fishing. It is unknown to what extent the area has been impacted by fishing activities. Category A or B.
Global Importance	This site is important as a large seamount in the NE Atlantic and part of the Horseshoe Seamounts range. The biology of this site urgently requires investigation using modern survey techniques. Provisionally Category A.
Associated Species	**Cnidaria, Hydroidea** *Lytocarpia myriophyllum* (Ramil et al., 1998; 36° 30.2'N 11° 37.9'W, 250m; 36° 28.5'N, 11° 33.7'W, 350-355m; 36° 31.1'N, 11° 32.5'W, 255-265m; 36° 30.2'N, 11° 31.0'W, 155m) *Streptocaulus corneliusi* (Ramil et al., 1998; 36° 30.2'N 11° 37.9'W, 250m; 36° 28.5'N, 11° 33.7'W, 350-355m; 36° 31.5'N, 11° 38.0'W, 350-360m; 36° 24.2'N, 11° 43.2'W, 1005-1040m; ; 36° 33.4'N, 11° 28.8'W, 300-330m; 36° 44.3'N, 11° 23.0'W, 1940-2075m) *Antenella secundaria* (Ramil et al., 1998; 36° 30.2'N 11° 37.9'W, 250m; 36° 33.7'N, 11° 30.1'W, 305-320m)

Nemertesia antennina (Ramil et al., 1998; 36° 30.2'N 11° 37.9'W, 250m)

Plumularia setacea (Ramil et al., 1998; 36° 30.2'N 11° 37.9'W, 250m)

Pseudoplumaria sabinae (Ramil et al., 1998; 36° 31.5'N, 11° 38.0'W, 350-360m; 36° 26.4'N, 11° 40.2'W, 805-830m; 36° 24.2'N, 11° 43.2'W, 1005-1040m; 36° 33.4'N, 11° 28.8'W, 300-330m; 36° 31.1'N, 11° 32.5'W, 255-265m; 36° 33.7'N, 11° 30.1'W, 305-320m; 36° 34.9'N, 11° 28.4'W, 460-480m)

Halecium beanii (Ramil et al., 1998; 36° 26.4'N, 11° 40.2'W, 805-830m)

Halecium sessile (Ramil et al., 1998; 36° 26.4'N, 11° 40.2'W, 805-830m)

Cladocarpus elongatus (Ramil et al., 1998; 36° 26.4'N, 11° 40.2'W, 805-830m; 36° 24.2'N, 11° 43.2'W, 1005-1040m)

Aglaophenia tubulifera (Ramil et al., 1998; 36° 33.4'N, 11° 28.8'W, 300-330m; 36° 31.1'N, 11° 32.5'W, 255-265m; 36° 30.2'N, 11° 31.0'W, 155m; 36° 33.7'N, 11° 30.1'W, 305-320m)

Kirchenpaueria bonnevieae simplex (Ramil et al., 1998; 36° 33.4'N, 11° 28.8'W, 300-330m)

Kirchenpaueria pinnata (Ramil et al., 1998; 36° 38.0'N, 11° 29.8'W, 605-675m)

Halecium tenellum (Ramil et al., 1998; 36° 31.0'N, 11° 34.6'W, 54-62m)

Aglaophenia tubiformis (Ramil et al., 1998; 36° 31.0'N, 11° 34.6'W, 54-62m)

Gorgonacea

*Acanthogorgia armata** (Grasshoff, 1985)

*Villogorgia bebrycoides** (Grasshoff, 1985)

*Bebryce mollis** (Grasshoff, 1985)

*Swiftia pallida** (Grasshoff, 1985)

*Nicella granifera** (Grasshoff, 1985)

* = The wording in Grasshoff (1985) is unclear as to whether these species all occur on Gorringe Bank or whether some of them occur in Portuguese waters not necessarily on the Gorringe Bank.

Scleractinia

Lophelia pertusa (Freiwald, 1998)

Madracis pharensis (36° 29.9'N, 11° 33'W, 150-430m)

Peponocyathus folliculus (Ormonde Seamount; Zibrowius, 1980)

Paracyathus pulchellus (200m, Ormonde Seamount; Zibrowius, 1980)

Deltocyathus moseleyi (Ormonde Seamount, 36° 39.9'N, 11° 05.8'W, 826-931m; Zibrowius, 1980)

Pisces

Macroramphosus scolopax (Maul, 1976)

Raja sp

Seriola riviolana

Seriola dumerili

Sarda sarda

Torpedo torpedo

Torpedo marmorata

Phycis sp

Serranus atricauda

Mobula sp.

Aphanopus carbo

Category A

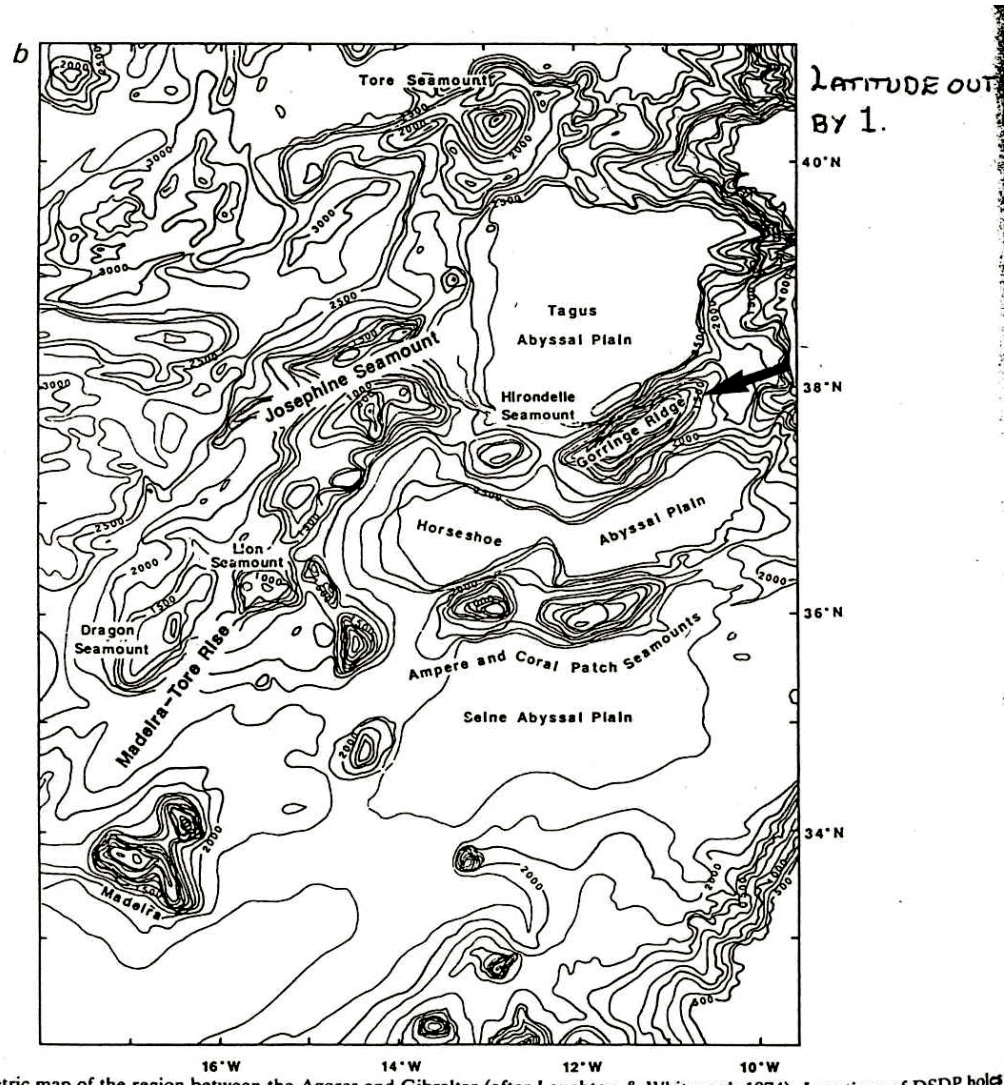


Figure 1. (a) Bathymetric map of the region between the Azores and Gibraltar (after Laughton & Whitmarsh 1974). Locations of DSDP holes 120, 135 and 136 are indicated by triangles. Contours are in fathoms. The dashed lines indicate the 200 nm territorial waters of Madeira, Morocco and Portugal. JS—Josephine Seamount and TS—Tore Seamount. (b) Bathymetric map of the Madeira–Tore Rise (after Laughton *et al.* 1972). Contours are in fathoms.

Fig. 2.2.3.1: Bathymetric map of the region between the Azores and Gibraltar

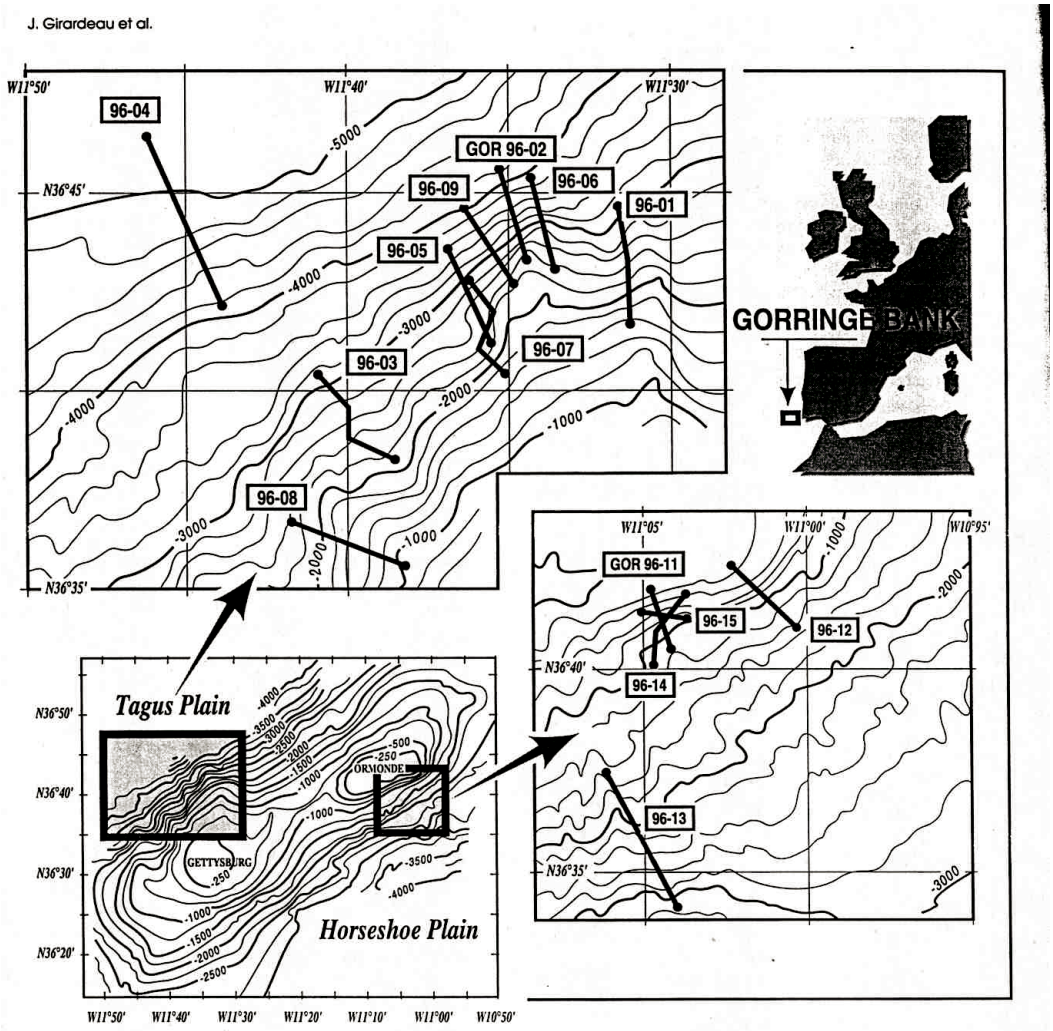


Figure 1. Localisation du banc de Gorringe sur la marge ibérique et emplacement des sites de plongée.

Location of the Gorringe Bank on the Iberian margin and dive sites.

Fig. 2.2.3.2: Location of the Gorringe Bank on the Iberian Margin and dive sites

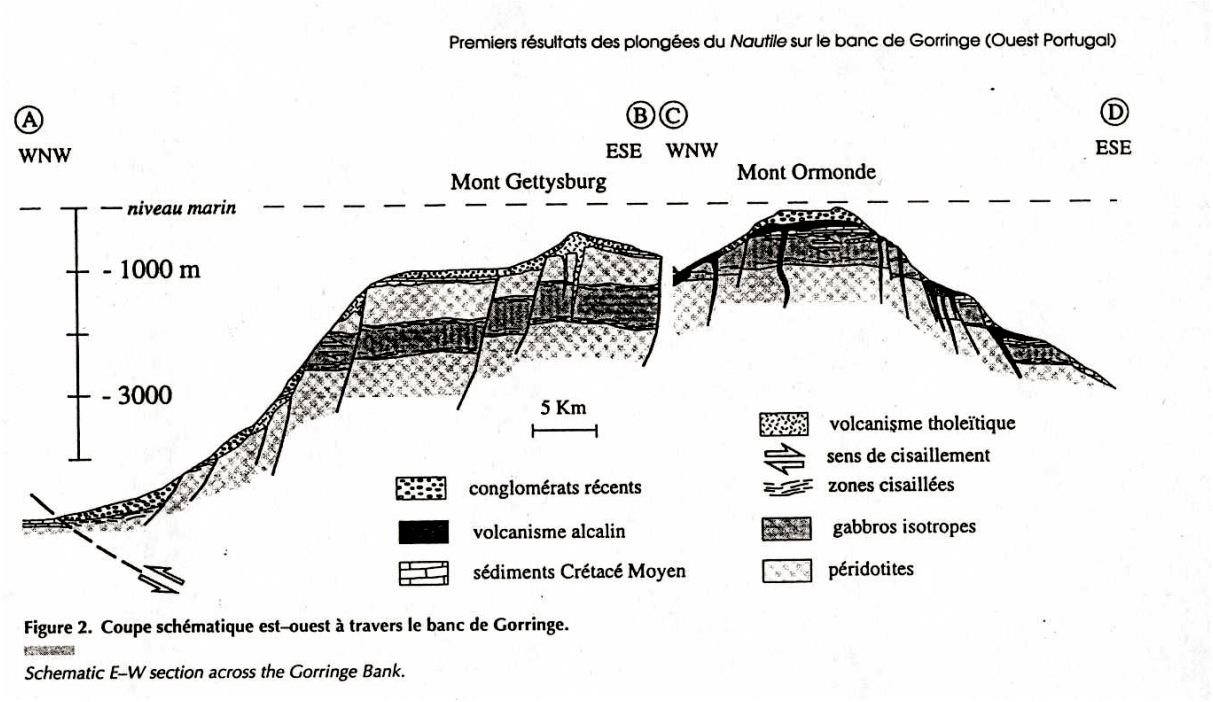


Figure 2. Coupe schématique est–ouest à travers le banc de Gorringe.

Schematic E–W section across the Gorringe Bank.

Fig. 2.2.3.3: Schematic E-W-section across the Gorringe Bank

2.2.4 La Chapelle Bank (France)

Site name	**La Chapelle Bank**
ID	107
Position	Western area Approx.: 47° 40'N, 08° 00'W; 47° 53'N; 07° 30'W; 47° 49,N, 08° 14'W; 48° 00'N, 08° 00'W. Eastern area Approx. outlined by: 47° 49'N, 07° 26'W; 47° 41'N, 07° 38'W; 47° 33'N, 07° 38'W; 47° 27'N, 07° 07'W; 47° 44'N, 07° 12'W.
Jurisdiction	France
Site Area	2,600 square miles.
Site Classification	Reef
Extent of Habitat	Latest results unpublished, but this is a site with a large concentration of *Lophelia pertusa* and other reef-forming corals. Category A.
Description	This is a large area reported by Le Danois (1948) to be formed by two main banks or areas of banks. The western area runs from the shelf break at 200m to 1,000m in depth and is reported to have a high abundance of Dendrophyllia cornigera. The eastern part is in a similar situation but surrounds the western side of La Chapelle Bank itself. This area was described to have a high degree of cover of *Lophelia pertusa* and Madrepora oculata. A warm water species, Pleurocorallium madeirense was described as occurring in the south west of the bank.
Representation of Habitat	This is an important site of coral occurrence on the European margin and has been recently studied by scientists from Germany and Belgium. Category A.
Conservation Status	Unknown. Recent survey results have not been published so it is not possible to estimate current coral coverage and the extent of damage to the area from trawling. I would suggest that contact is made with Dr Andre Freiwald, University of Tuebingen to ascertain the current status of this reef.
Global Importance	This is a large area of coral occurrence and one of the most important sites in the NE Atlantic. Category A.
Associated Species	**Cnidaria, Scleractinia** *Lophelia pertusa* *Dendrophyllia cornigera* (47º 34.9'N, 07º 01.3'W; Zibrowius, 1980)
Category	A

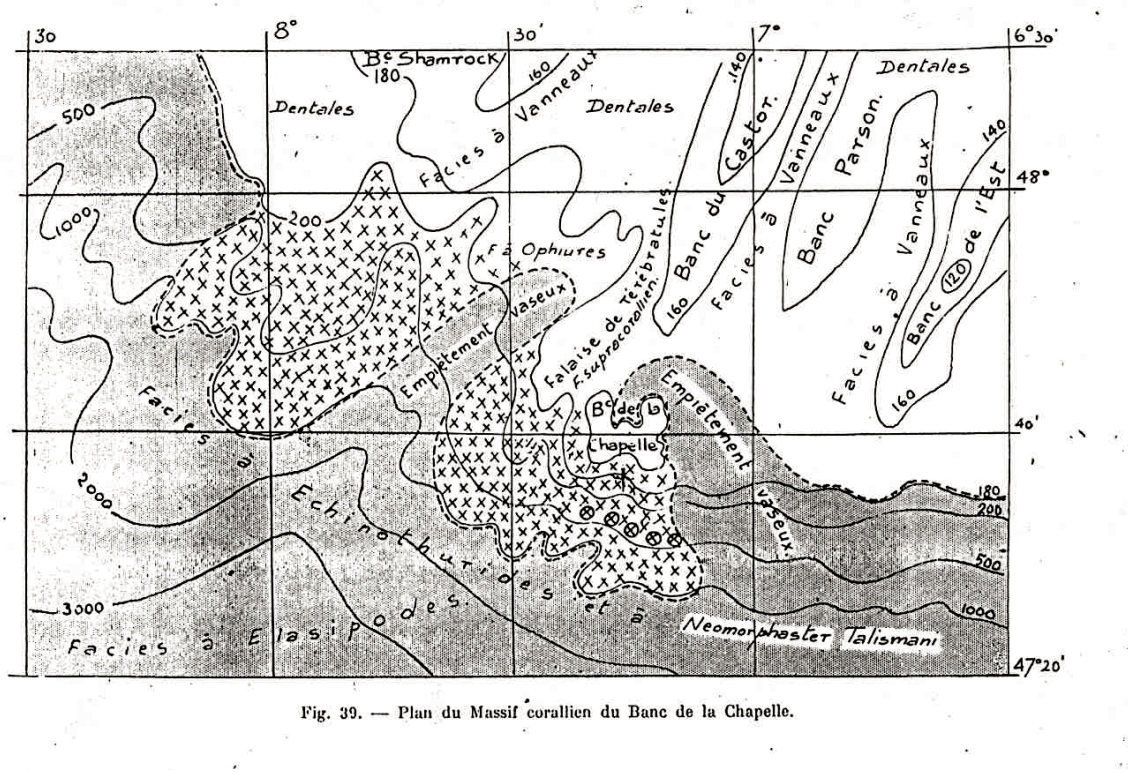


Fig. 39. — Plan du Massif corallien du Banc de la Chapelle.

Fig. 2.2.4.1: Benthic communbities at the Banc de la Chapelle.

2.3 Bibliography reefs

Bett BJ (1999)Cruise Report No. 25. RRS Charles Darwin Cruise 112C, 19th May - 24th June, 1998 Atlantic Margin Environmental Survey: Seabed survey of the deep-water areas (17th Round Tranches) to the north and west of Scotland. NERC/University of Southampton. Published by Challenger Division for Seafloor Processes. Southampton Oceanography Centre, European Way, Southampton, SO14 3ZH.

Bett BJ (2000) Initial assessment of seabed observations made during the White Zone (WhiZ) Environmental Survey (seabed survey of the deeper waters to the north and west of Shetland, 13 August - 14 September, 1999). White Zone DTI marine Surveys 1999 Preliminary Report January 2000. Southampton Oceanography Centre, Southampton, UK.

Bizon G, Muller C, Vieban F (1985) Mesozoic and Cenozoic sediments of the Ionian Sea (ESCARMED Campaigns – Malta Escarpment, Alfeo and Medina Seamounts) biostratigraphic analysis – foraminifers, nanoplankton and microfacies. Revue de l'Institut Français du Petrole, 40 (4): 431-455.

Bower AS, Armi L, Ambar I (1995) Direct evidence of Meddy formation off the south-western coast of Portugal. Deep-Sea Research I, 42 (9): 1621-1630.

Brierley AS, Thorpe JP, Pierce GJ, Clarke MR, Boyle PR (1995) Genetic variation in the neritic squid *Loligo forbesi* (Myopsida, Loliginidae) in the Northeast Atlantic Ocean. Marine Biology, 122 (1): 79-86.

Buchanan JY (1886) On oceanic shoals discovered in the S.S. "Dacia" in October, 1883. Proceedings of the Royal Society of Edinburgh, 13 (121): 428-443.

Burrows M, Thorpe SA (1999) Drifter observations of the Hebrides Slope current and nearby circulation patterns. Annales Geophysicae – Atmospheres, Hydrospheres and Space Sciences, 17 (2): 280-302.

Charier S, Bijuduval B, Morel Y, Renard V (1987) Malta escarpment, Alfeo and Medina Seamounts – former margins of the Ionian Basin. Revue de L'Institut Français du Pétrole, 42 (6): 695-745.

Challenger (1980) RRS Challenger Cruise 11/80. Cruise Report. Scottish Marine Biological Association, Oban, Argyll, Scotland, 14pp. Unpublished manuscript.

Clarke AM, Downey ME (1992) Starfishes of the Atlantic. Chapman & Hall, London, 794pp.

D'Addabbo M, Grimaldi SD, Morone MRD, Pietanza R, D'Addabbo R, Todaro MA (1999) Diversity and dynamics of an interstitial Tardigrada population in the Meloria Shoals, Ligurian Sea, with a redescription of *Batillipes similis* (Heteroterdigrada, Batillipedidae). Italian Journal of Zoology, 66 (1): 51-61.

D'Addabbo MG, Pietanza R, D'Addabbo R, Morone MRD, Grimaldi SD (1999) A redescription of *Actinarctus doryphorus* (Tardigrada, Heterotargrada) Cahiers de Biologie Marine, 40 (1): 21-27.

Diehl M (1970) Die neue, ökologisch extreme Sand-Ascidie von der Josephine-Bank: *Seriocarpa rhizoides* Diehl 1969 (Ascidiacea, Styelidae). Meteor Forschungsergerbnisse D7: 43-58.

Dollfus RP (1924) Contribution à la faune des Invertébrés du banc de Rockall (Matériaux récoltés par M.G. Hamel pendant la crosière du sous le commandement du Dr J.B. Charcot). Bulletin de l'Institut océanographique, Monac° 21(438): 28pp

Eckhardt JD, Glasby GP, Puchelt H, Berner Z (1997) Hydrothermal manganese crusts from Enarete and Palinuro Seamount in the Tyrrhenian Sea. Marine Georesources and Geotechnology, 15 (2): 175-208.

Everaarts JM, Den Besten PJ, Hillebrand MTJ, Halbrook RS, Shugart LR (1998) DNA strand breaks, cytochrome P-450-dependent monooxygenase system activity and levels of chlorinated biphenyl congeners in the pyloric caeca of the seastar (*Asterias rubens*) from the North Sea. Ecotoxicology, 7 (2): 69-79.

Faggion O, Pinna E, Savelli C, Schreider AA (1995) Geomagnetism and age study of Tyrrhenian seamounts. Geophysical Journal International, 123 (3): 915-930.

Folkow LP, Martensson PE, Blix AS (1996) Annual distribution of hooded seals (*Cystophora cristata*) in the Greenland and Norwegian Seas. Polar Biology, 16 (3): 179-189.

Frederiksen R, Jensen A, Westerberg H (1992) The distribution of the scleractinian coral *Lophelia pertusa* around the Faeroe Islands and the relation to internal tidal mixing. Sarsia, 77: 157-171.

Freiwald A (1998) Geobiology of *Lophelia pertusa* (Scleractinia) reefs in the North Atlantic. Habilitationsschrift zur Erlangung der venia legendi am Fachbereich Geowissenschaften der Universität Bremen. 116pp.

Freiwald A, Wilson JB, Henrich R (1999) Grounding Pleistocene icebergs shape recent deep-water coral reefs. Sedimentary Geology, 125: 1-8

Fuiza AFG, Hamann M, Ambar I, del Ri° GD, Gozalez N, Cabanas JM (1998) Water masses and their circulation off western Iberia during May, 1993. Deep-Sea Research I, 45 (7): 1127-1160.

Gage JD, Tyler PA (1991) Deep-Sea Biology: A Natural History of Organismsat the Seafloor. Cambridge University Press, Cambridge, 504pp.

Galil B, Zibrowius H (1998) First benthos samples from Eratosthenes Seamount, Eastern Mediterranean. Senckenbergiana Maritima, 28 (4/6): 111-121.

Girardeau J, Cornen G, Agrinier P, Beslier MO, Dubuisson G, Le Gall B, Monnier C, Pinheiro L, Ribeiro A, Whitechurch H (1998) Preliminary results of Nautile dives on the Gorringe Bank (West Portugal). Comptes Rendus de L'Academie des Sciences Serie II Fascicule A – Sciences de la Terre et des Planetes, 326 (4): 247-254.

Gordon JDM (1994) Deep-water fisheries: A new resource? A summary of the 1994 Buckland Lecture by John D.M. Gordon. Scottish Association for Marine Science, P° Box 3, Oban, PA34 4AD, UK., 8pp.

Grasshoff M (1972) Infraspezifische Variabilität und isolierte Populationen der Hornkoralle *Ellisella flagellum* (Cnidaria: Anthozoa: Gorgonaria) Auswertung der "Atlantischen Kuppenfahrten 1967" von F.S. "Meteor" Meteor Forschungsergerbnisse D10: 65-72.

Grasshoff M (1985) Die Gorgonia und Antipatharia der Grossen Meteor Bank und der Josephine Bank. Senckenbergiana Maritima, 17 (1/3): 65-87.

Haase KM, Devey CW (1994) The petrology and geochemistry of Vesteris Seamount, Greenland Basin – an intraplate alkaline volcano of non-plume origin. Journal of Petrology, 35 (2): 295-328.

Hackett B, Roed LP (1994) Numerical modelling of the Halten Bank area: a validation study. Tellus Series A - Dynamic Meteorology and Oceanography, 46 (2): 113-133.

Hallock P (1996) Reefs and reef limestones in earth history. In: Birkeland C (Ed.) Life and Death of Coral Reefs, Chapman & Hall, New York, pp.13-42

Heezen BC, Hollister CD (1971) The Face of the Deep. Oxford University Press, London, 659pp.

Heike W, Wanninger A (1985) The Victor Hensen Seahill (central Ionian Sea) – morphology and structural aspects. Marine Geology, 64 (3-4): 343-350.

Hempel P, Schreiber R, Johnson L, Thiede J (1991) The Vesterisbanken Seamount (Greenland Basin): Patterns of morphology and sediment distribution. Marine Geology, 96: 175-185.

Henrich R, Hartmann M, Reitner J, Schäfer P, Steinmetz S, Freiwald A, Dietrich P, Thiede J (1993) Facies, belts, biocoenoses, volcanic structures and associated sediments of the Arctic seamount Vesteris banken (central Greenland Sea). Facies, 27: 71-104.

Henrich R, Freiwald A, Betzler C, Bader B, Schafer P, Samtleben C, Brachert TC, Wehrmann A, Zankl H, Kuhlmann DHH (1995) Controls on modern carbonate sedimentation on warm-temperate to Arctic coasts, shelves and seamounts in the Northern Hemisphere: implications for fossil counterparts. Facies, 32: 71-108.

Henriet JP, De Mol B, Pillen S, Vanneste M, Van Rooij D, Versteeg W, Croker PF, Shannon PM, Unnithan V, Bouriak S, Chachkine P, The Porcupine-Belgica 97 Shipboard Party (1998) Gas hydrate crystals may help build reefs. Nature (London), 391: 648-649.

Hesthagen IH (1970) On the near-bottom plankton and benthic invertebrate fauna of the Josephine Seamount and the Great Meteor Seamount. Meteor Forschungsergebnisse, D, 8: 61-70

Hillgruber N, Kloppmann M (1999) Distribution and feeding of blue whiting *Micromesistius poutassou* larvae in relation to different water masses in the Porcupine Bank area, west of Ireland. Marine Ecology Progress Series, 187: 213-225.

Hillgruber N, Kloppmann M, Wahl E, Von Westernhagen H (1997) Feeding of larval blue whiting and Atlantic mackerel: a comparison of foraging strategies. Journal of Fish Biology, 51: 230-249.

Hojgaard DP (1999) Food and parasitic nematodes of saithe, *Pollachius virens* (L.),from the Faeroe Islands. Sarsia, 84 (5-6): 473-478.

Holt TJ, Rees EI, Hawkins SJ, Seed R (1998) Natura 2000, Volume IX: Biogenic Reefs. English Nature/Scottish Association for Marine Sciences, 170pp.

Horwood JW, Millner RS (1998) Cold-induced abnormal catches catches of sole. Journal of the Marine Biological Association of the U.K., 78 (1): 345-347.

Hovland M, Croker PF, Martin M (1994) Fault-associated seabed mounds (carbonate knolls ?) off western Ireland and north-west Australia. Marine and Petroleum Geology, 11 (2): 232-246.

Hovland M, Mortensen PB, Brattegard T, Strass P, Rokoengen K (1998) Ahermatypic coral banks off Mid-Norway: evidence for a link with seepage of light hydrocarbons. Palaios, 13: 189-200.

Huys R, Andersen PF, Kristensen RM (1992) *Tantaculus hoegi* Gen. et Sp. Nov. (Tantaculocarida, Deoterthridae) from the meiobenthos of the Faeroe Bank, North Atlantic. Sarsia, 76 (4): 287-297.

Huys R, Todaro MA (1997) *Meloriastacus ctenidis* gen. et sp. nov.: A primitive interstitial copepod (Harpacticoida; Leptastacidae) from Tuscany. Italian Journal of Zoology, 64 (2): 181-196.

ICES (1995) Report of the study group on the biology and assessment of deep-sea fisheries resources. ICES Headquarters, 24-30 August, 1994. ICES, Copenhagen, Denmark. 91pp

Jacobs CL, Masson DG (2000) Preliminary surface geology interpretation from TOBI Sidescan Sonar, 3.5KHz profiles and WASP camera. White Zone DTI marine Surveys 1999 Preliminary Report January 2000. Southampton Oceanography Centre, Southampton, UK.

James NP, (1983) Reefs in carbonate depositional environments. In: Scholle PA, Bebout DG, Moore CH (Eds.) AAPG Memoir 33. American Association of Petroleum Geologists, Tulsa, Oklahoma, pp. 345-462.

Johansen T, Naevdal G (1995) Genetic analysis of population structure of tusk in the North Atlantic. Journal of Fish Biology, 47: 226-242.

Jones EJW, Siddall R, Thirlwall MF, Chroston PN, Lloyd AJ (1994) Seamount Anton Dohrn and the evolution of the Rockall Trough. Oceanologica Acta, 17 (3): 237-247.

Kenyon NH, Ivanov MK, Akmetzhanov AM (1998) Cold water carbonate mounds and sediment transport on the Northeast Atlantic margin. Preliminary results of the geological and geophysical investigations during the TTR-7 cruise of R/V Professor Logachev in co-operation with the CORSAIRES and ENAM2 programmes July-August, 1997. Intergovernmental Oceanographic Commission Technical Series, 52. 179pp. UNESCO, Paris, France.

Klitgaard AB (1995) The fauna associated with outer shelf and upper slope sponges (Porifera, Demospongiae) at the Faeroe Islands, Northeastern Atlantic. Sarsia, 80:1-22.

Kröncke I (1992) Macrofauna standing stock of the Dogger Bank, a comparison. 3. 1950-54 versus 1985-87: a final summary. Helgolander Meeresuntersuchungen, 46 (2): 137-169.

Kröncke I, Knust R (1995) The Dogger Bank: a special ecological region in the central North Sea. Helgolander Meeresuntersuchungen, 49 (1-4): 335-353.

Kuhn T, Halbach P, Maggiulli M (1996) Formation of ferromanganese microcrusts inrelation to glacial/interglacial stages in Pleistocene sediments from Ampere Seamount (subtropical NE Atlantic). Chemical Geology, 130 (3-4): 217-232.

Kuijpers A, Andersen MS, Kenyon NH, Kunzendorf H, van Weering TCE (1998) Quaternary sedimentation and Norwegian Sea overflow pathways around Bill Bailey Bank, north-eastern Atlantic. Marine Geology, 152 (1-3): 101-127.

Kunze E, Sanford TB (1993) Submesoscale dynamics near a seamount. 1. Measurements of Ertel vorticity. Journal of Physical Oceanography. 23 (12): 2567-2588.

Larsen AH, Sigurjonsson J, Oien N, Vikingsson G, Palsboll P (1996) Populations genetic analysis of nuclear and mitochondrial loci in skin biopsies collected from central and north-eastern North Atlantic humpback whales (*Megaptera novaeangliae*): poplation identity and migratory destinations. Proceedings of the Royal Society of London Series B-Biological Sciences, 263 (1376): 1611-1618.

Lebreiro SM, McCave IN, Weaver PPE (1997) Late Quaternary turbidite emplacement on the Horseshoe abyssal plain (Iberian margin). Journal of Sedimentary Research, 67 (5): 856-870.

Lebreiro SM, MoreNo JC, McCave IN, Weaver PPE (1996) Evidence for Heinrich layers off Portugal (Tore Seamount: 39 degrees N, 12 degrees W). Marine Geology, 131 (1-2): 47-56.

Le Danois E (1948) Les Profondeurs de la Mer. Payot, Paris, France, 303pp.

Levin LA, Thomas CL (1988) The ecology of xenophyophores (Protista) on eastern Pacific seamounts. Deep-Sea Research, 12 (12): 2003-2027.

Lickorish WH, Grasso M, Butler RWH, Argnani A, Maniscalc° R (1999) Structural styles and regional tectonic setting of the "Gela Nappe" and frontal part of the Maghrebian thrust belt in Sicily. Tectonics, 18 (4): 655-668.

Malod JA, Vanney JR (1980) A geomorphological study of the Le Danois Bank slope (North Spanish continental margin) based on a multi-beam ech° sounder survey and observations with the submersible Cyana. Annales de L'Institut Oceanographique, 56 (Suppl. S): 73-83.

Marova NA, Yevsyukov YD (1987) Geomorphology of Mount Ampere (The Atlantic Ocean). Oceanology, 27 (4): 608-612.

Martin AP, Wade IP, Richards KJ, Heywood KJ (1998) The PRIME eddy. Journal of Marine Research, 56 (2): 439-462.

Martinez I, Pastene LA (1999) RAPD-Typing of central and eastern North Atlantic and western North Pacific minke whales, *Balaenoptera acutorostrata.* ICES Journal of Marine Science, 56 (5): 640-651.

Maul GE (1976) The fishes taken in bottom trawls by R.V. "Meteor" during the 1967 Seamounts Cruises in the Northeast Atlantic. Meteor Forschungsergebnisse. D22:1-69.

McCormick R (1992) The potential deepwater species fishery in the North Atlantic. Report for Bord Iascaigh Mhara, Dun Laoghaire, Dublin, Ireland.

Minniti M, Bonavia FF, DacquiNo C Raspa G (1986) Distribution of Mn, Fe, Ni, C° and Cu in young sediments on the Palinuro Seamount in the Southeast Tyrrhenian Sea (Mediterranean). Marine Mining, 5 (3): 277-305.

Molines JM (1991) Modelling the barotropic tides in the straits of Sicily and Tunisian Shelf. Oceanologica Acta, 14 (3): 241-252.

Monniot C, Monniot F (1992) Ascidies des seamounts lusitaniens (campagne Seamount 1). Bulletin de Museum Nationale Histoire Naturelle, Paris, 4e Ser 14 Section A (3/4): 591-603.

Mortensen PB, Hovland M, Brattegard T, Farestveit R (1995) Deep water bioherms of the scleractinian coral *Lophelia pertusa* (L.) at 64oN on the Norwegian Shelf: structure and associated megafauna. Sarsia, 80: 145-158.

Nielsen TG, Munk P (1998) Zooplankton diversity and the predatory impact by larval and small juvenile fish at the Fisher Banks in the North Sea. Journal of Plankton Research, 20 (12): 2313-2332.

Nielsen TG, Sabatini M (1996) Role of cyclopoid copepods *Oithona* spp. in North Sea plankton communities. Marine Ecology Progress Series, 139 (1-3): 79-93.

O'Brien B, Fives JM (1995) Ichthyoplankton distribution and abundance off the west coast of Ireland. ICES Journal of Marine Science, 52 (2): 233-245.

Peirce C, Barton PJ (1991) Crustal structure of the Madeira-Tore Rise, Eastern North Atlantic; Results of a DOBS wide-angle and normal incidence seismic experiment in the Josephine Seamount Region. Geophysical Journal International, 106 (2): 357-378.

Perrone A (1985) Report on the biological survey of Amendolara Seamount – Nudibranchia of Amendolara Seamount. Journal of Molluscan Studies, 51: 102-103. Supplement PR.

Piazzi L, Balestri E, Magri M, Cinelli F (1997) The spread of the tropical alga *Caulerpa racemosa* (Forsskal) J. Agardh (Bryopsidophyceae, Chlorophyta) along the Tuscan coast (Italy). Cryptogamie Algologie, 18 (4): 343-350.

Priede IG, Raid T, Watson JJ (1995) Deep-water spawning of Atlantic mackerel *Scomber scombrus*, west of Ireland. Journal of the Marine Biological Association of the U.K. 75 (4): 849-855.

Rad U von (1974) Great Meteor and Josephine Seamounts (eastern North Atlantic): composition and origin of bioclastic sands, carbonate and pyroclastic rocks. Meteor Forschungsergebnisse, C, 19: 1-61.

Ragonese S, Giusto GB (1997) *Chaunax pictus* Lowe 1846 – first record of the family Chaunacidae in the Mediterranean Sea. Journal of Fish Biology, 51 (5): 1063-1065.

Ragonese S, Giusto G (1999) Range extension for *Trachyscopia cristulata echinata* (Pisces: Scorpaenidae) in the western Mediterranean Sea. Bulletin of Marine Science, 64 (2): 329-334.

Rainer SF (1991) Distribution, growth and production of *Nephtys hombergii* and *N. assimilis* (Polychaeta, Nephtyidae) in benthic communities of the North Sea. Bulletin of Marine Science, 48 (2): 330-345.

Ramil F, Vervoort W, Ansín JA (1998) Report on the Haleciidae and Plumularioidea (Cnidaria, Hydrozoa) collected by the French Seamount 1 Expedition. Zoologische Verhandelingen, 322: 1-42.

Rice AL, Thurston MH, New AL (1990) Dense aggregations of a hexactinellid sponge, *Pheronema carpenteri*, in the Porcupine Seabight (Northeast Atlantic Ocean), and possible causes. Progress in Oceanography, 24: 179-196.

Rice AL, Tyler PA, Paterson GJL (1992) The pennatulid *Kophobelemnon stelliferum* (Cnidaria: Octocorallia) in the Porcupine Seabight (Northeast Atlantic Ocean). Journal of the Marine Biological Association of the UK, 72: 417-434.

Rice AL, Williamson DI (1977) Planktonic stages of Crustacea Malacostraca from Atlantic seamounts. Meteor Forschungsergebnisse, D, 26: 28-64.

Roberts DG, Hogg NG, Bishop DG, Flewellen CG (1974) Sediment distribution around moated seamounts in the Rockall Trough. Deep-Sea Research, 21: 175-184.

Robertson AHF (1998) Tectonic significance of the Eratosthenes Seamount: a continental fragment in the process of collision with a subduction zone in the eastern Mediterranean (Ocean Drilling Programme Leg 160). Tectonophysics, 298 (1-3): 63-82.

Rogers AD (1994) The biology of seamounts. Advances in Marine Biology, 30: 305-350.

Rogers AD (1999) The biology of *Lophelia pertusa* (Linnaeus 1758) and other deep-water reef-forming corals and impacts from human activities. International Review of Hydrobiology, 84 (4): 315-410.

Scoffin TP, Bowes GE (1988) The facies distribution of carbonate sediments on Porcupine Bank, Northeast Atlantic. Sedimentary Geology, 60 (1-4): 125-134.

Shelton GAB (1980) *Lophelia pertusa* (L.) Electrical conduction and behaviour in a deep-water coral. Journal of the Marine Biological Association of the U.K., 60: 517-528.

Sokolova MN (1994) Feeding peculiarities of macrobenthos from seamounts as seen on sea urchins. Transactions of the PP Shirshov Institute of Oceanology, Vol. 129 Bottom Fauna of Seamounts (Eds. Kuznetsov AP, Mironov AN): pp 31-43 (in Russian).

Stehmann M (1993) New records of an adult couple of *Malacoraja kreffti* (Stehmann, 1977) from the Rockall Trough area, Eastern North-Atlantic (Pisces, Rajiformes, Rajidae). Archiv fur Fischereiwissenschaft, 41 (3): 169-186.

Tanner SJ, Williams CA (1984) A detailed survey near Mount Eratosthenes Eastern Mediterranean. Marine Geophysical Research, 6 (2): 205-222.

Todaro MA, Kristensen RM (1998) A new species and first report of the genus *Nanaloricus* (Loricifera, Nanaloricida, Nanaloricidae) from the Mediterranean Sea. Italian Journal of Zoology, 65 (2): 219-226.

Tunnicliffe V, Juniper SK, de Burgh ME (1985) The hydrothermal vent community on Axial Seamount, Juan de Fuca Ridge. Bulletin of the Biological Society of Washington, 6: 453-464.

Tyler PA, Zibrowius H (1992) Submersible observations of the invertebrate fauna on the continental slope south-west of Ireland (NE Atlantic Ocean) Oceanologica Acta, 15 (2): 211-226.

Uchupi E, Ballard RD (1989) Evidence of hydrothermal activity of Marsili Seamount, Tyrrhenian Basin. Deep-Sea Research, 36 (9): 1443-1448.

United States Board of Geographic Names (1981) "Gazetteer of Undersea Features", 3rd Edition. Defense Mapping Agency, Washington D.C.

Van Aken HM, Deboer CJ (1995) On the synoptic hydrography of intermediate and deep-water masses in the Iceland Basin. Deep-Sea Research I, 42 (2): 165-189.

Wehausen R, Brumsack HJ (1999) Cyclic variations in the chemical composition of eastern Mediterranean Pliocene sediments: a key for understanding sapropel formation. Marine Geology, 153 (1-4): 161-176.

White M, Mohn C, Orren MJ (1998) Nutrient distributions across the Porcupine Bank. ICES Journal of Marine Science, 55 (6): 1082-1094.

Wilson JB (1979a) 'Patch' development of the deep-water coral *Lophelia pertusa* (L.) on Rockall Bank. Journal of the Marine Biological Association of the United Kingdom, 59: 165-177.

Wilson JB (1979b) The distribution of the coral *Lophelia pertusa* (L.) [L. prolifera (Pallas)] in the North East Atlantic. Journal of the Marine Biological Association of the UK 59: 149-164.

Yevsyukov YD (1994) Morphology of Palinuro and Poseidon Sea Mounts (South- East part of the Tyrrhenian Sea). Oceanology, 34 (3): 454-459.

Zhuleva EV (1987) Submarine photoprofiling in geological study of the Vercelli Seamount (The Tyrhennian Sea) Oceanology, 27 (5): 808-815.

Zibrowius H (1980) Les Scléractiniaires de la Méditerranée et de l'Atlantique nord-oriental. Memoires de l'Institut Oceanographique Foundation Albert Ier, Prince de Monaco 11: 247pp, 107pl

2.4 Analysis of offshore reefs inventory (WWF, overview maps and tables)

In this chapter, the maritime areas of European Union member states are mapped and the locations of sites indicated which are described by the definition of "reefs" (Natura 2000 code 1170) in the Interpretation Manual of European Union Habitats (EUR 15/2). Tables list country by country the most important facts for each of the sites. For a full description of the sites please consult Volume IV, holding the complete information as supplied by A.D. Rogers (SOC) in his report to WWF. The identity numbers in the detailed maps (Fig. 2.2. to 2.4) correspond to the identity number in the tables in this volume (Tab. 2.1 to 2.6) and in the reefs database (Vol. IV).

2.4.1 North Sea

In the maritime areas (200 nm zones) of European Union member states in the North Sea, no sites are described by the definition of "reefs" (Natura 2000 code 1170) in the Interpretation Manual of European Union Habitats (EUR 15/2) For the UK see Fig. 2.2)

2.4.2 UK and Ireland

Fig. 2.2: Overview map of the maritime areas (200 nm zone) of the United Kingdom and Ireland depicting sites described by the definition of "reefs" (Natura 2000 code 1170) in the Interpretation Manual of European Union Habitats (EUR 15/2).

Tab. 2.2: List of sites in the maritime area (200 nm zone) of the United Kingdom described by the definition of "reefs" (Natura 2000 code 1170) in the Interpretation Manual of European Union Habitats (EUR 15/2). Category A: reef with good information B: bank/seamount with no information on substrate C: bank/seamount with uncertain information on substrate but most likely to be a reef D: sandbank

ID	Name	Position	Jurisd.	Site area	Extent of habitat	Cat.
29	Rosemary Bank	Centred on 59° 12' 00"N, 10° 15' 00"W. The area is approx. outlined by the following points: 59° 33'N, 10° 00'W; 59° 12'N, 09° 19'W; 58° 54'N, 10° 0'W; 59° 05'N, 10° 57'W.	UK	Approx. 2,800km^2	100%	A
30	George Bligh Bank	Irregular shaped feature centring on 59° 00' N, 14° 00'W. Area is approx. outlined by the following co-ordinates: 58° 59'N, 13° 16'W; 58° 45'N, 13° 22'W; 58° 39'N, 14° 00'W; 58° 42'N, 14° 39'W; 59° 10'N, 14° 28'W; 59° 24'N, 13° 56'W.	UK	Approx. 8,000 km^2	There is little information on the George Bligh Bank in relation to the relative coverage of hard substrates on the seamount so whether it is classed as a reef or not is unknown. The bank occupies 100% of the site area.	C
31	Anton Dohrn Seamount	Summit approx.: 57° 25' 00"N, 11° 10' 00"W, diameter of seamount approx. 50km. Area outlined approx. by the following co-ordinates: 57° 21'N, 11° 32'W; 57° 40'N, 11° 07'W; 57° 23'N, 10° 40'W; 57° 10'N, 11° 06'W.	UK	Approx. 1,960km^2	100% (Category A)	A
32	Hebrides Terrace Seamount	56° 25' 00"N, 10° 25' 00"W. Area approx. outlined by the following co-ordinates: 56° 16'N, 10° 06'W; 56° 20'N, 10° 42'W; 56° 30'N, 10° 37'W; 56° 38'N, 10° 06'W.	UK	Approx. 1,000 km^2	Not found	B
39	Darwin Mounds West	Over 150 mounds in an area outlined by the following co-ordinates: 59° 49.0'N, 07° 26.75'W; 59° 49.89'N, 07° 23.87'W; 59° 49.98'N, 07° 19.49'W; 59° 47.5'N, 07° 19.49'W; 59° 47.5'N, 07° 26.75'W.	UK	30km^2 (surveyed to date)	Uncertain as not all the mounds have been surveyed to ascertain the presence of coral. Probably Category A or B, including mound tails.	A
40	"Darwin Mounds" East	Centred on 59° 52'N, 07° 05'W, depth Approx. 1,050 m	UK	Approx. 10km^2	Uncertain as not all the mounds have been surveyed	A

ID	Name	Position	Jurisd.	Site area	Extent of habitat	Cat.
		(Jacobs & Masson, 2000; Bett, 2000). The area is subrectangular and outlined by co-ordinates: 59° 49' 37"N, 07° 11' 23"W; 59° 51' 31"N, 07° 11' 23"W; 59° 51' 57"N, 07° 05' 35"W; 59° 51' 08"N, 06° 58' 41"W, 59° 51' 57"N, 06° 58' 41"W.			to ascertain the presence of corals. Probably Category B. Approx. 5-10% including mound tails.	
41	Rockall Plateau / Rockall Bank	The area is approx. outlined by the following co-ordinates: 54° 52'N, 18° 15'W; 56° 49'N, 17° 30'W; 56° 52'N, 16° 15'W; 57° 19'N, 15° 37'W; 58° 07'N, 15° 45'W; 58° 30'N, 14° 15'W; 57° 45'N, 12° 52'W; 55° 38'N, 14° 52'W.	UK/ Ireland	The shallow part of the Rockall Bank is approx. 9,000 km^2 in area.	Unknown. The proportion of hard and soft substrates making up the surface of the bank and the full extent of coral coverage are both unknown.	A
42	SE Rockall Bank Reefs	Numerous reefs occurring in a band Approx. 150km long, lying between 500-1,000m depth in an area marked out by the following co-ordinates: 55° 24.18'N, 15° 51.27'W; 55° 18.37'N, 16° 50.18'W; 55° 24.75'N, 16° 51.81'W; 55° 46.5'N, 15° 08.18'W; 55° 42.75'N, 15° 03.82'W.	UK/ Ireland	2,200km^2	Unknown at present. The area was described as containing numerous closely spaced mounds. Coverage maybe above 15% (Category A).	A
225	Dogger Bank	54° 50' 00"N, 02° 20' 00"E. Area approx. outlined by the following co-ordinates: 54° 36'N, 01° 11'E; 55° 03'N, 01° 14'E; 56° 00'N, 05° 09'E; 55° 24'N, 04° 48'E; 54° 20'N, 02° 59'E; 54° 06'N, 01° 47'E.	UK/NL/ GER	N/A	This site is a sandbank, not a reef.	D

Tab. 2.3: List of sites in the maritime area (200 nm zone) of Ireland described by the definition of "reefs" (Natura 2000 code 1170) in the Interpretation Manual of European Union Habitats (EUR 15/2). Category A: reef with good information B: bank/seamount with no information on substrate C: bank/seamount with uncertain information on substrate but most likely to be a reef D: sandbank

ID	Name	Position	Jurisd.	Site area	Extent of habitat	Cat.
41	Rockall Plateau / Rockall Bank	The area is approx. outlined by the following co-ordinates: 54° 52'N, 18° 15'W; 56° 49'N, 17° 30'W; 56° 52'N, 16° 15'W; 57° 19'N, 15° 37'W; 58° 07'N, 15° 45'W; 58° 30'N, 14° 15'W; 57° 45'N, 12° 52'W; 55° 38'N, 14° 52'W.	UK/ Ireland	The shallow part of the Rockall Bank is approx. 9,000 km^2 in area.	Unknown. The proportion of hard and soft substrates making up the surface of the bank and the full extent of coral coverage are both unknown.	A
42	SE Rockall Bank Reefs	Numerous reefs occurring in a band Approx. 150km long, lying between 500-1,000m depth in an area marked out by the following co-ordinates: 55° 24.18'N, 15° 51.27'W; 55° 18.37'N, 16° 50.18'W; 55° 24.75'N, 16° 51.81'W; 55° 46.5'N, 15° 08.18'W; 55° 42.75'N, 15° 03.82'W.	UK/ Ireland	2,200km^2	Unknown at present. The area was described as containing numerous closely spaced mounds. Coverage maybe above 15% (Category A).	A
43	Porcupine Bank	Lies between latitudes 51° - 54° N and longitudes 12° and 15°W, west of Ireland.	Ireland	10,000 km^2	100% (Category A)	A
44	North-western flank of the Porcupine Bank	Uncertain but a dredge sampled this mound between 53° 46.60'N, 13° 56.61'W (680m depth) to 53° 46.49'N, 13° 56.98'W (730m depth). Other samples included: 53° 46.55'N, 13° 56.83'W (flank of mound, 668m depth); 53° 46.54'N, 13° 56.83'W (689m depth); 53° 46.48'N, 13° 56.71'W (685m depth).	Ireland	Unknown.	Unknown but probably forms more than 15% of habitat (Category A).	C
45	North-western flank of the Porcupine Bank	Exact position unknown but this mound was sampled at 53° 45.39'N, 14° 00.22'W.	Ireland	Unknown but probably approx. 0.75km^2	Unknown but probably more than 15% if the structure of this mound is similar to others in the area (Category A).	C
46	North-western flank of the Porcupine Bank	Only Approx. known. This site was sampled at 53° 47.38'N, 13° 54.72'W (depth 746m).	Ireland	Unknown. Simply described as a small carbonate mound.	If this site is similar to other such habitats in the area then coverage is likely to be more than 15% (Category A), but no coral was recovered from a single sample so it is possible this site is Category B or C or has no live coral present at all.	C
47	Northern Porcupine Seabight - Kenyon Large Mound 1 /Hovland	Approximate but centring on Approx. 52° 13.66'N 13' 12° 34.66'W. From west to east it stretches from 12° 35.48'W to	Ireland	2km^2	Approx. 100% (Category A)	A

ID	Name	Position	Jurisd.	Site area	Extent of habitat	Cat.
	Reef 6	12° 33.84'W it is uncertain how far it stretches from north to south.				
48	Northern Porcupine Seabight, Kenyon Large Mound Two / Hovland reef or knoll 1.	Approximate. Crest of the mound is reported to be at 52° 13.99'N, 12° 43.38 (Kenyon et al., 1998). However, this position would appear to be slightly west and to the north of the position shown in Hovland et al. (1994). The latter paper reports a smaller mound closer to the position reported by Kenyon et al. (1998), but also at a shallower depth. It appears likely that Kenyon Large Mound Two and Hovland Reef 1 are the same objects but there positions have been reported differently. It also seems likely that another mound lies Approx. 1.5km to the north of Large Mound 2 at a depth of Approx. 730m.	Ireland	Approx. 3km^2	100% (Category A)	A
49	Northern Porcupine Seabight, Kenyon Large Mound 3/ Hovland Knoll 3.	Approx. centres on 52° 09.1N, 12° 49.68W	Ireland	Approx. 1.5km^2	Unknown. This mound was cored but was not surveyed for live corals.	A
50	Kenyon Large Mound 4 / Hovland Knoll 4.	Reef forms an approximate triangle with the corners at 52° 10.75'N, 12° 44.28'W; 52° 09.55'N, 12° 46.08'W; 52° 07.9'N, 12° 44.4'W (measured from Hovland et al., 1994)	Ireland	5.5km^2	Approx. 50% (Category A).	A
51	Kenyon Small Mound 1	Approximate, but cored at 52° 12.73'N, 13° 02.38W (Kenyon et al., 1998). Maybe visible on Fig. 2 of Hovland et al., (1994)	Ireland	0.03km^2	Unknown.	C
52	Kenyon Small Mound 2	Approximate, but a core was taken to the SE of the feature at 52° 11.94'N, 13° 02.74W (Kenyon et al., 1998).	Ireland	0.03km^2	Unknown but probably 50% or more (Category A)	C
53	Kenyon Small Mound 4	Approximate, a core was taken on the feature at 52° 18.88'N, 12° 40.70'W (Kenyon et al., 1998).	Ireland	0.03km^2	Unknown but probably 50% or more (Category A)	A
54	Hovland Reef 5	Centring on Approx. 52° 09.25'N, 12° 34.8'W	Ireland	Approx. 0.6km^2	Unknown.	C
55	Hovland Knoll No. 2	Subcircular reef Approx. centring on 52° 13.9'N, 12° 42.72'W	Ireland	Approx. 1.32km^2	Unknown but probably around 50% (Category A).	A
56	Un-named reef reported in	Approx. centred on 52° 13.3'N, 12° 49.2'W	Ireland	Approx. 1 km^2	Unknown.	C

ID	Name	Position	Jurisd.	Site area	Extent of habitat	Cat.
	Hovland et al. (1994)					
57	Un-named reef reported in Hovland et al. (1994)	Approx. 52° 11.5'N, 12° 50.'W	Ireland	Approx. 0.35km^2	Unknown.	C
58	Un-named mound from Hovland et al. (1994).	Approx. 52° 10.75' N, 12° 46.2'W	Ireland	Approx. 0.07km^2	Unknown. This is a small feature reported as a knoll in Hovland et al. (1994).	C
59	Un-named mound shown in Fig. 3 of Hovland et al. (1994)	Approx. 52° 10.75'N, 12° 44.64'W	Ireland	Approx. 0.42 km^2	Unknown.	C
60	Un-named mound feature shown in Fig. 3 Hovland et al (1994)	Approx. 52° 10.3'N, 12° 42.24'	Ireland	0.07km^2	Unknown. If this feature is a coral associated mound then extent of habitat is likely to be greater than 15% (Category A)	C
61	Un-named mound feature shown in Fig. 3 Hovland et al (1994)	Approx. 52° 10.75'N, 12° 41.4'W	Ireland	0.03km^2	Unknown.	B
62	Un-named mound feature shown in Fig. 3 Hovland et al (1994)	Approx. 52° 09.47'N, 12° 33.36'W'	Ireland	0.28km^2	Unknown.	C
63	Hovland un-named knoll	52° 13.8'N, 12° 55.9'W	Ireland	Unknown	Unknown	B
64	Hovland un-named knoll	52° 19'N, 13° 00'W	Ireland	Unknown	Unknown	B
65	Hovland un-named knoll	52° 17.4'N, 13° 01.3'W	Ireland	Unknown	Unknown	B
66	Hovland un-named knoll	52° 15.8'N, 13° 02.6'W	Ireland	Unknown	Unknown	B
67	Hovland un-named knoll	52° 15.0'N, 13° 02.6'W	Ireland	Unknown	Unknown	C
68	Hovland un-named knoll	52° 15.8'N, 13° 03.9'W	Ireland	Unknown	Unknown	B
69	Hovland un-named knoll	52° 19.7'N, 12° 31.2'W	Ireland	Unknown	Unknown	B
70	Hovland un-named knoll	52° 15.8'N, 12° 13'W	Ireland	Unknown	Unknown	B
71	Hovland un-named knoll	52° 14.2'N, 12° 13'W	Ireland	Unknown	Unknown	B
72	Hovland un-named knoll	52° 14.2'N, 12° 19.5'W	Ireland	Unknown	Unknown	B
73	Hovland un-named knoll	52° 15.0'N, 12° 19.5'W	Ireland	Unknown	Unknown	B
73-1	Kenyon Small Mound 3	Approximate, a core was taken near the base of the feature at 52° 19.19'N, 12° 59.07'W (Kenyon et al., 1998). Maybe visible on Fig. 2 of Hovland et al., (1994).	Ireland	0.03km^2	Unknown but probably 50% or more (Category A)	C
74	Magellan Reefs	These reefs are located in an area outlined by the following approximate co-ordinates. 52° 13.6'N, 13° 09.2'W; 52° 35.4'N, 12° 39.1'W; 52° 31.4'N, 12° 17.2'W; 52° 16.3'N, 12° 18.4'W; 52°	Ireland	Approx. 1,300km^2	Unknown (Category C ?)	C

ID	Name	Position	Jurisd.	Site area	Extent of habitat	Cat.
		16.3'N, 12° 48.3'W; 52° 09.5'N, 13° 00'W (calc. Fig 1b Henriet et al. 1998				
75	Eastern Porcupine Seabight Coral Reefs/ Mounds Area	Area centred on point at 51° 28' 25" N, 11° 42' 55" W, depth Approx. 850m. The area is outlined by an irregular rectangle with following points at corners: 51° 17' 01"N, 11° 42' 30"W; 51° 38' 25"N, 11° 51' 15"W; 51° 40' 11"N, 11° 41' 40"W; 51° 18' 04"N, 11° 36' 00"W.	Ireland	Approx. 100km^2	Mounds cover Approx. 30-40% of the area but how many of these are associated with live coral is unknown.	C
76	Eastern Porcupine Seabight	Approx. centred on 51° 38' 25"N, 11° 46' 23"W, depth Approx. 750 m.	Ireland	Approx. 1km^2	Unknown.	C
77	Eastern Porcupine Seabight	Approx. centred on 51° 36' 29"N, 11° 49'10"W, depth Approx. 750 - 800 m.	Ireland	Approx. 0.5km^2	Unknown.	B
78	Eastern Porcupine Seabight	Approx. centred on 51° 35' 21"N, 11° 47' 13"W, depth Approx. 850 m.	Ireland	Approx. 1.3km^2	Unknown.	B
79	Eastern Porcupine Seabight	Approx. centred on 51° 35' 26"N, 11° 43' 20"W, depth Approx. 700-800 m.	Ireland	Approx. 1.3km^2	Unknown.	B
80	Eastern Porcupine Seabight	Approx. centred on 51° 34' 34" N, 11° 41' 07" W, depth Approx. 950 m.	Ireland	Approx. 2 km^2	Unknown.	B
81	Eastern Porcupine Seabight	Approx. centred on 51° 33' 31"N, 11° 40' 58" W, depth Approx. 850 m.	Ireland	Approx. 0.22 km^2	Unknown.	B
82	Eastern Porcupine Seabight	Approx. centred on 51° 33' 52"N, 11° 43' 37 "W, depth Approx. 800-850 m.	Ireland	Approx. 5 km^2	Unknown but possibly 70 % (Category A).	C
83	Eastern Porcupine Seabight	Approx. centred on 51° 32' 59"N, 11° 43' 45 "W, depth Approx. 850 m.	Ireland	Approx. 1.3 km^2	Unknown but possibly 100 % (Category A).	C
84	Eastern Porcupine Seabight	Approx. centred on 51° 32' 48"N, 11° 41' 15 "W, depth Approx. 750 m.	Ireland	Approx. 2.66 km^2	Unknown.	C
85	Eastern Porcupine Seabight (AT24Gr)	Approx. centred on 51° 28' 57"N, 11° 41' 23 "W, depth Approx. 800 m.	Ireland	Approx. 2.5 km^2	Unknown but probably more than 15% (Category A).	C
86	Eastern Porcupine Seabight	Approx. centred on 51° 25' 37"N, 11° 43' 53 "W, depth Approx. 900 m.	Ireland	Approx. 1 km^2	Unknown.	B
87	Eastern Porcupine Seabight	Approx. centred on 51° 24' 07"N, 11° 44' 18 "W, depth Approx. 950 m.	Ireland	Approx. 1.7 km^2	Unknown.	B
88	Eastern Porcupine Seabight (AT34, 35, 36?)	Approx. centred on 51° 23' 52"N, 11° 40' 50 "W, depth Approx. 650-800 m.	Ireland	Approx. 8.5 km^2	Unknown but possibly over 15 % (Category A).	C
89	Eastern Porcupine Seabight	Approx. centred on 51° 24' 55"N, 11° 38' 53 "W, depth Approx. 600 m.	Ireland	Approx. 1.1 km^2	Unknown but possibly 100 % (Category A).	C
90	Eastern Porcupine Seabight	Approx. centred on 51° 22' 38"N, 11° 40' 33 "W, depth Approx. 700-800 m.	Ireland	Approx. 3 km^2	Unknown.	B
91	Eastern Porcupine Seabight	Approx. centred on 51° 21' 40"N, 11° 40' 50" W, depth Approx. 700-800 m.	Ireland	Approx. 1.75 km^2	Unknown.	B

ID	Name	Position	Jurisd.	Site area	Extent of habitat	Cat.
92	Eastern Porcupine Seabight	Approx. centred on 51° 18' 46"N, 11° 40' 50" W, depth Approx. 800-1,000 m.	Ireland	Approx. 2.7 km^2	Unknown.	B
93	Teresa Reef (previously mud volcano Teresa)	Circular area centring on 51° 25.6'N, 11° 46.26W	Ireland	Approx. 2km^2	Unknown but certainly above 50% (Category A)	A
94	Belgica Reefs	Unpublished and probably not completely surveyed. At least part of this reef-system lies within a box marked by the following points: 51° 15.4'N, 11° 30'W; 51° 15.4' N, 11° 52.8'W; 51° 19.3'N, 11° 52.8'W; 51° 19.'N, 11° 30'W (from Kenyon et al., 1998).	Ireland	Approx. 200km^2	Unknown. Whether any of the outcropping buried features of the Belgica reefs are associated with live coral communities is unknown at present.	B
105	Hurd Bank	50° 45' 11° 20'W (Le Danois, 1948)	Ireland	Unknown	Unknown	C
106	Great Sole Bank	Not given	Ireland	Unknown	Unknown.	C

2.4.3 France and Spain

Fig. 2.3: Overview map of the maritime areas (200 nm zone) of France and Spain in the Atlantic depicting sites described by the definition of "reefs" (Natura 2000 code 1170) in the Interpretation Manual of European Union Habitats (EUR 15/2).

Tab. 2.4: List of sites in the maritime area (200 nm zone) of France in the Atlantic described by the definition of "reefs" (Natura 2000 code 1170) in the Interpretation Manual of European Union Habitats (EUR 15/2). Category A: reef with good information B: bank/seamount with no information on substrate C: bank/seamount with uncertain information on substrate but most likely to be a reef D: sandbank

ID	Name	Position	Jurisd.	Site area	Extent of habitat	Cat.
107	La Chapelle Bank	Western area Approx.: 47° 40'N, 08° 00'W; 47° 53'N; 07° 30'W; 47° 49,N, 08° 14'W; 48° 00'N, 08° 00'W. Eastern area Approx. outlined by: 47° 49'N, 07° 26'W; 47° 41'N, 07° 38'W; 47° 33'N, 07° 38'W; 47° 27'N, 07° 07'W; 47° 44'N, 07° 12'W.	France	2,600 square miles.	Latest results unpublished, but this is a site with a large concentration of *Lophelia pertusa* and other reef-forming corals. Category A.	A
108	Grand Vasiére	Along the continental slope from 45° 30'N, 03° 50'W - 47° 15'N, 05° 50'W	France	Unknown	Unknown. The area has not been investigated for some time so the extent of coral habitat remaining in this area is uncertain.	C
96	Gascogne Knoll	45° 23' 00"N, 05° 21' 00"W	Spain and France	Not found	Not found	C

Tab. 2.5: List of sites in the maritime area (200 nm zone) of Spain in the Atlantic described by the definition of "reefs" (Natura 2000 code 1170) in the Interpretation Manual of European Union Habitats (EUR 15/2). Category A: reef with good information B: bank/seamount with no information on substrate C: bank/seamount with uncertain information on substrate but most likely to be a reef D: sandbank

ID	Name	Position	Jurisd.	Site area	Extent of habitat	Cat.
96	Gascogne Knoll	45° 23' 00"N, 05° 21' 00"W	Spain and France	Not found	Not found	C
97	Jovellanos Seamount	44° 28' 00"N, 04° 15' 00"W	Spain	Not found	Not found	B
98	Le Danois Bank	44° 05' 00"N, 05° 06' 00"W	Spain	Approx. 2,800 km^2	100% (Category A)	A
99	Charcot Seamounts	44° 50' 00"N, 13° 00' 00"W	Spain	Not found	Not found	B
109	Galicia Shelf East	The area is outlined by the following approximate co-ordinates: 44° 00'N, 07° 00'W; 44° 11'N, 07° 04'W; 44° 11'N, 07° 07'W; 44° 02'N, 07° 14'W.	Spain	Over 400 square miles (Le Danois, 1948)	Unknown at the present time.	C
110	Galicia Shelf West	Extent of area not fully surveyed. Approximate positions given in Le Danois (1948) were: 43° 42'N, 09° 00'W; 43° 50'N, 09° 09'W; 43° 37'N; 09° 24'W; 43° 20'N, 09° 42'W; 43° 08'N, 09° 37'W; 43° 28'N, 09° 16'W.	Spain	Unknown	An important coral area but of unknown current status.	A
111	Galicia Bank	42° 35' 00"N, 11° 35' 00"W. The shallow parts of the bank are outlined by the following co-ordinates: 43° 16'N, 11° 41'W; 43° 13'N, 12° 06'W; 42° 55'N, 12° 11'W; 42° 40'N, 12° 14'W; 42° 22'N, 12° 00'W; 42° 28'N; 11° 34'W; 42° 35'N, 11° 25'W. The total area is approx. outlined by the following co-ordinates: 42° 03'N, 10° 49'W; 42° 39'N, 10° 28'W; 43° 44'N, 11° 00'W; 43° 18'N, 12° 16'W; 42° 22'N, 13° 00'W; 42° 08'N, 12° 13'W.	Spain	Entire bank Approx. 17,000km^2. Shallow part of bank Approx. 6,250 km^2	Unknown but there are large areas of exposed hard substrates on the steep-slopes of this seamount. Provisionally Category A.	A

2.4.4 Portugal

In the maritime area (200 nm zone) of the Azores, there are 4 sites described by the definition of "reefs" (Natura 2000 code 1170) in the Interpretation Manual of European Union Habitats (EUR 15/2) (see Tab. 2.6 and Fig. 2.1). Only the EEZ of mainland Portugal is detailed in Fig. 2.4.

Fig. 2.4: Overview map of the maritime area (200 nm zone) of Portugal depicting sites described by the definition of "reefs" (Natura 2000 code 1170) in the Interpretation Manual of European Union Habitats (EUR 15/2).

Tab. 2.6: List of sites in the maritime area (200 nm zone) of Portugal and the Azores described by the definition of "reefs" (Natura 2000 code 1170) in the Interpretation Manual of European Union Habitats (EUR 15/2). Category A: reef with good information B: bank/seamount with no information on substrate C: bank/seamount with uncertain information on substrate but most likely to be a reef D: sandbank

ID	Name	Position	Jurisd.	Site area	Extent of habitat	Cat.
112	Vasco da Gama Seamount	41° 00'N, 11° 22'W. Area is approx. outlined by the following points: 40° 45'N, 11° 20'W; 41° 00'N, 11° 18'W; 41° 00'N, 11° 27'W; 41° 07'N, 11° 23'W.	Portugal	Approx. 300km2	Unknown. No details were found about this seamount but it is steep-sloped and probably has considerable areas of exposed hard substrate.	C
113	Vigo Seamount	41° 19'N, 10° 40'W. Area is approx. outlined by the following co-ordinates: 41° 33'N, 10° 31'W; 41° 31'N, 10° 38'W; 41° 18'N, 10° 43'W; 41° 13'N, 10° 54'W; 41° 06'N, 10° 47'W; 41° 08'N, 10° 35'W; 41° 20'N, 10° 30'W.	Portugal	Approx. 950km2	Unknown. No data was found on the surface composition of this seamount. The flanks are steep sided so it may have large areas of hard substrate exposed.	C
124	Sedlo Seamount	40° 25' 00"N, 26° 55' 00"W	Portugal /Azores	Not found	Not found	B
159	Ashton Seamount	38° 00' 00"N, 13° 20' 00"W	Portugal	Not found.	Not found.	B
176	Tore Seamount	Approx. centred on: 39° 24'N, 12° 51'W. Area Approx. outlined by: 38° 33'N, 13° 21'W; 38° 42'N, 13° 44'W; 39° 09'N, 14° 11'W; 39° 29'N, 13° 44'W; 39° 55'N, 13° 07'W; 39° 47'N, 12° 21'W; 39° 53'N, 11° 51'W; 39° 13'N, 11° 57'W, 38° 38'N, 12° 37'W.	Portugal	Approx. 8,000km2 (or more).	Unknown. However, as this site is volcanic it probably has large areas of hard substrates. Probably Category A.	A
177	Gorringe Ridge	36° 35' 00"N, 11° 25' 00"W. Area above 2000m depth outlined by the following co-ordinates: 37° 01'N, 10° 46'W; 36° 37'N, 10° 56'W; 36° 17'N, 11° 37'W; 36° 11'N, 11° 57'W; 36° 27'N, 12° 03'W; 36° 33'N, 12° 04'W; 36° 47'N, 11° 36'W.	Portugal	9,500km2	Large areas of exposed hard substrates. Category A.	A

ID	Name	Position	Jurisd.	Site area	Extent of habitat	Cat.
		36'W.				
180	Gettysberg Seamount	36° 30'00"N, 13° 00'00"W	Portugal	See Gorringe Bank	See Gorringe Bank	A
199	Ampere Seamount	35° 05'00"N, 12° 55'00"W. Area outlined by the following co-ordinates: 34° 46'N, 13° 32'W; 35° 04'N, 13° 32'W; 34° 53'N, 12° 41'W; 35° 18'N, 12° 46'W (from map in Peirce & Barton, 1991 - Note that labels for Latitude on Fig 1a in this paper are out by 1o)	Portugal	Approx. 3,600 km2	This seamount has a mix of substrates from sediments to exposed rock. Photographs show areas of a typical hard substrate, sessile faunal community. Category A.	A
200	Lion Bank or Seamount	35° 15' 00"N, 15° 35'00"W. Area outlined by the following co-ordinates: 35° 00'N, 15° 48'W; 35° 25'N, 15° 51'W; 35° 29'N, 15° 11'W; 35° 05'N, 15° 07'W.	Portugal	2,400km2	Unknown. However, it is likely that this seamount consists of a mix of substrates including large areas of exposed rock, boulders etc.	C
201	Coral Patch Bank or Coral Patch Seamount	34° 56'00"N, 11° 57'00"W: Area Approx. outlined by the following co-ordinates: 34° 54'N, 12° 28'N; 35° 07'N, 12° 21'W; 35° 18'N, 11° 02'W; 34° 49'N, 11° 25'W; 34° 40'N, 12° 00'W.	Portugal	Approx. 4,500km2	Unknown. However, this is a steep-sided seamount and is likely to have a variety of surface substrates including exposed rock, boulders etc.	C
202	Dragon Bank or Dragon Seamount	34° 55'00"N, 16° 30'00"W. Area Approx. outlined by the following co-ordinates: 34° 18'N, 17° 09'W; 35° 13'N, 16° 00'W; 35° 40'N, 16° 18'W; 35° 18'N, 16° 00'W; 34° 42'N, 16° 16'W.	Portugal	Approx. 4,500km2	Unknown. This seamount probably has similar surface substrates to other seamounts in the area.	C
208	Unicorn Bank	34° 45'00"N, 14° 30'00"W. Area Approx. outlined by the following co-ordinates: 34° 22'N, 14° 44'W; 35° 05'N, 14° 35'W; 34° 38'N, 14° 07'W.	Portugal	Approx. 4,000km2	Unknown. This seamount is probably similar to others on the Madeira-Tore Rise.	C
213	Seine Seamount	33° 50'00"N, 14° 20'00"W. Area Approx. outlined by the following co-ordinates: 33° 29'N, 14° 44'W; 33° 47'N, 14° 44'W; 34° 04'N, 14° 12'W; 33° 47'N, 14° 05'W; 33° 32'N, 14° 12'W.	Portugal	Approx. 3,000km2	Unknown. This is a poorly studied site but it is assumed that this seamount has a similar structure to others in the area and has a mix of surface substrates. Probably Category A.	A
158	Azores Bank	Approx. 38° 09'N, 29° 00'W	Azores/ Portugal	Not found.	Not found.	B
170	Princess Alice Bank	38° 05'00"N, 29° 15'00"W	Azores/ Portugal	Not found	Not found but probably Category A.	A
171	João de Castro Bank	38° 13'N, 26° 38'W	Azores/ Portugal	Not found	Hard substrates exceed 15%. Category A.	A

2.4.5 Conclusions

This is a first attempt to list, on a regional scale, habitat sites which potentially qualify as offsore SAC under the EU Habitats Directive. It appears, that also biological information is available for quite a number of reefs and seamounts , in particular in the Northeast Atlantic. Still, scientific knowledge is rather patchy and needs further improvement. However, in particular sites providing substrate for the growth of cold water corals like *Lophelia pertusa* supposedly harbour a rich fauna and associated food webs. As the corals form a habitat which is a nursery for many commercially harvested fish species, it is also in the interest of fisheries to safeguard the ecological integrity of this habitat.

In the Northeast Atlantic, more than 60 % of the reefs described for the 200 nm zones of EU member countries are located in Irish waters, mostly associated to the Celtic Shelf break. In the Porcupine Seabight and the Rockall Area, numerous small mounds are described, small features which go undistinguished in other places because less intensive research was done. Taking this as an example, it is obvious, that the knowledge will increase with the intensity of research and many more reefs will be detected. However, the present knowledge is enough to seriously consider many of the sites for protection from further destructive human impact under the EU Habitats Directive. This account can be a first step to establish an ecologically representative network of protected reefs under the EU Habitats Dirctive, providing for an ecological safety reserve in increasingly altered ecosystems.

3 SUBMERGED SANDBANKS IN EUROPEAN SHELF WATERS
(A. Velegrakis, M. B. Collins, G. Owrid and A. Houghton, SOC)

3.1 Data inventory Northeast Atlantic and North Sea

Fig. 3.1: Overview map of the Northeast Atlantic depicting sites described by the definition of "submerged sandbanks" (Natura 2000 code 1110) in the Interpretation Manual of European Union Habitats (EUR 15/2).

Tab. 3.1: List of sites in the Northeast Atlantic described by the definition of "submerged sandbanks" (Natura 2000 code 1110)) in the Interpretation Manual of European Union Habitats (EUR 15/2).

ID	Name	Lat. (°N)	Long.	Jurisd.	Site area (km^2)	Mid point water depth (m)	Sediments
1	The Varne	51.97	1.35	UK	16	3.70	sand
2	South Falls	51.36	1.79	UK	24	8.20	coarse sand, shingel, shells
3	Sandettie	51.24	1.95	F	58	5.50	coarse sand, broken shells
4	Goodwin Sands	51.25	1.52	UK	166	0.91	sand
5	Ridens de Calais	51.16	1.82	UK?	8	10.00	sand
6	West Dyck	51.09	2.08	F	39	6.40	sand
7	Oost Dyck	51.26	2.43	F+B	69	7.60	sand
8	Kwinte Bank	51.29	2.66	B	47	5.10	coarse sand, shells
9	Middelkerke Bank	51.32	2.75	B	18	5.80	coarse sand, broken shells
10	Inner Ruytingen.	51.21	2.28	F	9	4.80	sand
11	Outer Ruytingen	51.15	2.10	F	98	6.40	sand
12	Bergues Bank	51.28	2.35	F+B	36	13.00	sand
13	Radial Bank	51.55	2.23	F	2	15.60	sand, shells
14	North Falls	51.66	1.94	UK	11	9.40	sand, fine sand, broken shells
15	Galloper	51.79	1.97	UK	11	2.80	sand, gravel, shells
16	N.N.	51.48	2.28	F+B	6	13.70	fine sand, shells, gravel
17	Fairy Bank	51.47	2.39	F+B	96	10.00	fine, speckled sand, shells, gravels
18	N.N.	51.50	2.48	B	19	11.90	sand, shells
19	West Hinder	51.47	2.50	B	55	5.50	sand
20	N.N.	51.42	2.55	B	10	11.00	coarse sand, shells
21	North Hinder	51.63	2.58	B	13	8.50	sand, shells
22	East Hinder	51.58	2.68	B	37	11.90	coarse sand, shells
23	Bligh Bank	51.62	2.78	B	20	11.00	sand, shells
24		51.41	2.73	B	19	12.20	coarse sand, shells

ID	Name	Lat. (°N)	Long.	Jurisd.	Site area (km^2)	Mid point water depth (m)	Sediments
25	Goote Bank	51.45	2.85	B	29	20.00	sand
26	Thornton Bank	51.58	3.00	B	125	5.50	sand, shells
27	Rabs Bank	51.60	3.13	B+NL	80	8.50	sand
28		51.62	2.92	B	22	15.90	fine sand, shells
29		51.70	3.00	B	9	14.00	fine sand, shells
30		52.50	1.98	UK	7	10.60	fine sand, shells
31	Schar	51.68	3.13	B+NL	19	12.80	gravel, brown sand
32		51.73	3.16	NL	5	15.90	coarse, brown sand
33	Steenbanken	51.65	3.33	NL	48	5.80	sand
34	Middelbank	51.70	3.33	NL	50	11.80	coarse sand, shells
35	Schowen Bank	51.78	3.35	NL	60	11.00	coarse, brown sand
36	Inner Gabbard	51.92	1.90	UK	23	6.10	sand, mud, gravel, broken shells
37	Outer Gabbard	51.95	2.03	UK	8	8.80	sand
38		52.03	1.68	UK	15	15.10	sand
39		52.02	1.64	UK	64	11.20	fine sand
40		52.63	1.87	UK	41	4.60	sand
41	NE Cross Sands	52.70	1.97	UK	6	14.00	sand
42		52.73	1.98	UK	2	16.80	sand
43	Newarp Banks	52.75	1.92	UK	5	7.60	sand
44	Newarp Bank (W)	52.70	1.88	UK	8	11.50	sand
45	Winterton Shoal	52.74	1.78	UK	16	10.70	sand
46	Hearty Knoll	52.77	2.13	UK	17	9.70	sand
47	Winterton Ridge	52.84	2.00	UK	21	6.40	fine sand, shells
48		52.89	2.03	UK	8	16.50	sand, shells
49	Smith's Knoll	52.87	2.22	UK	42	10.00	sand
50	Hammond Knoll	52.87	1.94	UK	24	4.90	sand, gravel
51	North Hammond Knoll	52.90	1.94	UK	2	13.40	sand, gravel
52	Haisborough Sand	52.93	1.71	UK	58	9.70	sand, shells
53	Haisborough Tail	52.89	1.84	UK	62	6.10	sand, stones
54	Hewett Ridge	52.97	2.00	UK	51	12.80	sand, stones
55	Leman Bank	53.12	1.94	UK	104	4.20	sand
56	Ower Bank	53.22	1.92	UK	101	12.80	sand, small stones, shells
57	Inner Bank	53.22	2.00	UK	30	11.00	samd
58	Well Bank	53.22	2.11	UK	195	8.20	sand, stones
59	Broken bank	53.30	2.18	UK	59	14.70	sand, shells
60	Swarte Bank	53.38	2.24	UK	43	11.00	sand, mud
61	Viking Field	53.45	2.33	UK	92	16.50	sand
62	Haddock Bank	53.29	1.58	UK	160	8.50	sand, fine sand, gravel
63		53.48	1.46	UK	62	9.30	sand, stones
64	Inner Cromer Knoll	53.22	1.46	UK	18	11.60	fine sand
65	Cromer Knoll	53.31	1.28	UK	38	6.40	sand, stones, shingle
66	Brown Ridge	52.63	3.32	NL?	14	17.40	fine sand, broken shells
67	Dogger Bank	54.82	2.67	UK+NL+D	20000	18.30	sand, fine sand, shells, clay, mud
68	Outer Well Bank	54.12	2.00	UK	187	20.70	fine sand, shells, gravel

ID	Name	Lat. (°N)	Long.	Jurisd.	Site area (km^2)	Mid point water depth (m)	Sediments
69	The Hills	54.32	1.05	UK	650	270.00	sand
70	Outer Dowsing Shoal	53.46	1.10	UK	83	4.50	sand, shells, stones
71	Indefatigable Bank	53.55	2.33	UK	143	16.30	coarse sand, shells, gravel
72		55.75	-1.39	UK	2	4.60	gravel
73		55.99	-1.81	UK	4	49.00	sand
74		57.80	6.00	N	370	39.00	fine sand, ooze
75		57.13	5.50	N	70	43.00	sand, shingle
76		57.30	7.10	N	158	23.00	sand
77		57.10	7.34	DK	133	21.00	fine sand
78	Jutland Bank	56.85	7.36	DK	715	16.50	gravel, stones, sand
79		56.63	7.38	DK	62	25.00	sand, stones, mud
80	Berwick Bank	56.18	-1.38	UK	19	44.00	sand
81	Wee Bankie	56.33	-1.90	UK	219	34.00	fine sand, shells
82		56.24	-2.26	UK	53	44.00	fine sand, broken shells, gravel
83		56.60	-2.29	UK	6	32.00	sand
84		56.76	-2.12	UK	2	48.00	sand
85		56.71	-1.98	UK	10	44.00	sand
86	Scalp Bank	56.55	-1.99	UK	249	34.00	sand, gravel, shells
87	Marr Bank	56.41	-1.68	UK	566	44.00	sand, shells
88		56.62	-2.08	UK	3	43.00	sand
89	Smith Bank	58.10	-3.00	UK	1170	36.00	sand, shells
90		57.92	-2.43	UK	30	38.00	mud
91	West Bank	58.13	-2.07	UK	228	51.00	fine sand
92	South or Bosies Bank	58.05	-1.49	UK	518	64.00	sand, ooze
93		57.76	-2.22	UK	40	42.00	rock, sand, gravel
94	Turbot Bank	57.42	-0.97	UK	0	57.00	sand, shells
95		57.88	-0.88	UK	363	90.00	fine sand
96		58.16	-0.62	UK	54	89.00	sand
97	Halibut Bank	57.73	-0.19	UK	377	85.00	sand
98	Little Halibut Bank	58.30	-1.24	UK	389	67.00	sand
99		58.30	-1.80	UK	830	88.00	sand
100		58.52	-1.66	UK	56	77.00	sand
101		58.53	-1.30	UK	91	69.00	sand
102		58.41	-1.04	UK	27	93.00	sand
103	Dutch Bank	59.33	-0.80	UK	0	126.00	sand, ooze
104	Fairisle Bank	59.37	-1.55	UK	0	80.00	sand, shells
105	Papa Bank	59.70	-3.38	UK	0	57.00	sand, shells
106	Foula Bank	59.99	-2.22	UK	0	78.00	sand, shells
107	Bressay Bank	59.39	0.10	UK	33	82.00	fine sand
108	Forty Mile Bank	59.93	0.30	UK	58	82.00	sand
109	Pobie Bank	60.72	-0.12	UK	286	86.00	gravel
110		60.05	-0.58	UK	52	67.00	coarse sand, voral
111		59.99	1.42	UK	31	91.00	sand
112		60.08	1.50	UK	1480	92.00	sand, ooze
113	Bergen Bank	60.31	2.50	N	4332	95.00	fine sand
114		59.24	-6.18	UK	29	91.50	fine sand, shells
115	Sulisker Bank	59.02	-6.27	UK	143	46.00	rock, fine sand, shells

ID	Name	Lat. (°N)	Long.	Jurisd.	Site area (km^2)	Mid point water depth (m)	Sediments
116		58.82	-6.13	UK	2	60.00	fine sand
117	Solan Bank	59.07	-4.88	UK	18	51.00	fine sand, rock, shells, stones
118	Nun Bank	58.92	-4.92	UK	99	46.00	rock, shells, sand, gravel
119	White Head Bank	58.82	-4.35	UK	196	48.00	sand, shells, rock, stones
120	Froyabanken	63.77	7.42	N	444	161.00	sand, clay, shingle
121	Sklinden Banken	65.30	10.20	N	600	130.00	sand, clay, stones, gravel
122	Langgrynna	62.87	5.42	N	259	91.00	stones, gravel, sand
123		62.62	5.08	N	63	83.00	sand
124		64.08	1.00	N	84	1456.00	sand, ooze
125		63.27	3.70	N	28	980.00	sand
126		63.43	3.00	N	31	980.00	sand
127	Sydero Bank	61.55	-6.00	Faroe Isl.	1200	141.00	sand
128	Sando Bank	61.82	-5.42	Faroe Isl.	1386	143.00	sand
129	Nolso Bank	62.18	-5.29	Faroe Isl.	0	136.00	sand, gravel
130	Fuglo Bank	62.42	-5.42	Faroe Isl.	0	0.00	sand
131		61.00	-7.00	Faroe Isl.	314	464.00	sand
132		60.37	-7.10	Faroe Isl.	20	788.00	sand
133		60.40	-7.27	Faroe Isl.	41	902.00	sand
134		61.14	-7.38	Faroe Isl.	7	494.00	sand
135		59.58	-8.35	UK	163	827.00	sand, mud
136		59.91	-7.63	UK	65	470.00	sand
137	Faeroe Bank	60.97	-8.61	Faroe Isl.	4450	100.00	sand, shells, rock, coral, pebble
138		60.67	-9.38	UK	30	154.00	sand
139		60.33	-8.30	Faroe Isl.	20	485.00	sand, gravel
140		60.13	-8.77	Faroe Isl.	183	426.00	sand, gravel
141	Rosemary bank	59.25	-10.20	UK	28300	311.00	gravel, sand
142		59.88	-10.55	UK	75	771.00	mud, clay, sand
143		59.88	-10.81	UK	20	771.00	mud, sand, clay
144	Bill Bailey's Bank	60.62	-10.37	Faroe Isl.	1554	132.00	sand, shells
145	Outer Bailey or Lousy Bank	60.43	-12.61	Faroe Isl.	5000	174.00	sand, shells, stones
146	George Bligh Bank	58.94	-13.83	UK	388	428.00	sand, clay, mud
147	Anton Dohrn Sea-mount	57.45	-11.13	UK	1786	530.00	sand, rock
148	Rockall Bank	57.34	-13.90	UK+Ire ?	10692	130.00	sand, fine sand, gravel
149	Empress of Britain Bank	56.32	-15.00	UK+Ire ?	101	143.00	fine sand
151		54.63	-10.01	Ireland	19	95.00	fine sand, shells
152	Stanton Banks	56.20	-7.83	UK	330	38.00	sand, shells, calcareous weed, rock
153		56.21	-7.65	UK	2	94.00	fine sand, shells
154		56.36	-6.68	UK	16	12.00	sand, shells, gravel, mud
155		56.35	-7.36	UK	100	12.70	mud, sand, shells
156		56.33	-6.65	UK	22	19.90	sand, gravel, stones
157		56.25	-6.67	UK	11	34.00	sand
158	Scarinish Bank	56.49	-6.74	UK	14	23.00	sand, shells,

ID	Name	Lat. (°N)	Long.	Jurisd.	Site area (km^2)	Mid point water depth (m)	Sediments
							gravel, pebbles
159		56.18	-6.35	UK	10	14.90	sand, shells, rock
160	Dubh Artach	56.09	-6.75	UK	52	43.00	mud, fine sand
161		56.19	-6.64	UK	2	27.00	sand
162		55.07	-9.04	Ireland	2	43.00	sand
163		55.10	-8.55	Ireland	106	44.00	sand
164		52.42	-7.71	Ireland	5	46.00	sand, gravel
165		55.76	-7.16	Ireland	27	39.00	coarse sand, gravel
166		55.87	-6.77	UK	3	43.00	fine sand
167	Hempton's Turbot Bank	55.44	-6.95	UK	3	15.80	coarse sand, shells, gravel
168	West Bank	55.73	-6.59	UK	2	11.90	gravel, sand
169		55.64	-6.84	UK	2	40.00	sand, shells
170		55.55	-6.80	UK	1	29.00	sand
171		55.44	-6.72	UK	5	35.00	fine sand, shells
172	Middle Bank	55.47	-6.46	UK	13	25.00	sand, shells
173	Laconia Bank	55.37	-6.36	UK	16	20.10	sand, shells
174		54.33	-12.68	Ireland	24	1536.00	sand
175	Porcupine Bank	53.28	-13.74	Ireland	5220	152.00	coarse and fine sand
176		52.38	-12.52	Ireland	25	478.00	sand, mud
177		53.60	-10.72	Ireland	31	97.00	sand
178		55.00	-5.73	UK	9	29.00	sand, shells, gravel
179		55.09	-5.37	UK	7	33.00	fine sand, shells
180	Rigg Bank	54.65	-5.48	UK	3	11.00	sand
181		54.52	-5.16	UK	3	63.00	fine sand, mud
182		54.50	-5.06	UK	2	75.00	fine sand, mud
183		54.53	-4.97	UK	2	43.00	sand, mud
184		54.50	-5.17	UK	6	67.00	fine sand, shells
185		54.45	-5.12	UK	27	54.00	fine sand, broken shells
186		54.49	-4.88	UK	4	38.00	sand, broken shells
187		54.39	-5.25	UK	3	67.00	mud
188		54.38	-5.15	UK	21	83.00	sand
189		54.41	-5.12	UK	2	81.00	sand
190		54.46	-5.06	UK	11	59.00	sand, fine sand
191	Ardglass Bank	54.22	-5.57	UK	6	14.60	fine sand
192		54.12	-5.03	UK	4	14.80	coarse sand, broken shells
193		53.40	-5.66	Ireland	23	29.00	fine sand
194	Bennet Bank	53.38	-5.98	Ireland	0	13.50	sand
195	Burford Bank	53.30	-6.02	Ireland	160	4.60	sand
196	Kish bank	53.24	-5.92	Ireland	4.6	1.60	sand
197	Bray Bank	53.17	-5.90	Ireland	17	4.70	sand
198	Codling Bank	53.13	-5.87	Ireland	21	2.60	sand
199	India Bank	53.03	-5.89	Ireland	2	7.80	gravel
200	Arklow Bank	52.81	-5.95	Ireland	34	0.90	gravel, sand, stones
201		52.87	-5.99	Ireland	2	16.50	sand
202		54.52	-4.45	UK	9	23.00	sand, shells
203		54.66	-4.26	UK	2	25.00	sand
204	Three Fathoms Bank	54.68	-3.67	UK	12	2.80	sand, broken shells
205	Workington Bank	54.65	-3.64	UK	13	5.40	sand

ID	Name	Lat. (°N)	Long.	Jurisd.	Site area (km^2)	Mid point water depth (m)	Sediments
206	King William Banks	54.44	-4.11	UK	33	3.40	sand, shells
207	Ballacash Bank	54.44	-4.21	UK	13	2.30	sand
208	Bahama Bank	54.38	-4.25	UK	10	1.30	sand, shingle, shells
209	Wart Bank	54.03	-4.77	UK	2	12.30	sand
210		53.85	-4.63	UK	3	45.00	sand, fine sand, shells
211		53.87	-4.52	UK	4	42.00	fine sand
212		53.84	-4.60	UK	2	50.00	sand, stones, shells
213		53.81	-4.65	UK	9	45.00	sand, stones, shells
214		53.79	-4.87	UK	4	45.00	coarse sand, broken shells
215		53.77	-4.85	UK	4	42.00	coarse sand, broken shells
216		53.75	-4.84	UK	3	43.00	sand, shells
217		53.67	-4.40	UK	4	44.00	stones, broken shells, sand
218		53.52	-4.71	UK	6	46.00	gravel, broken shells, coarse sand
219		53.50	-4.76	UK	44	38.00	coarse sand, broken shells
220	Constable Bank	53.38	-3.75	UK	21	5.00	sand, gravel
221		53.19	-5.03	UK	1	49.00	mud, sand, stones, broken shells
222		53.24	-4.63	UK	0	11.70	sand
223		53.17	-4.54	UK	0	16.00	sand
224		53.16	-4.54	UK	1	12.00	sand
225		53.15	-4.51	UK	4	17.20	sand, shells
226		53.14	-4.48	UK	0	7.20	sand, shells
227	The Tripods	52.83	-4.77	UK	2	10.10	sand
228	Devil's Ridge	52.75	-4.67	UK	10	10.80	sand, stones, shells
229	Bastram Shoal	52.71	-4.78	UK	7	6.30	sand, shells, coral
230	The Devil's Tail	52.67	-4.68	UK	21	23.00	sand, gravel
231		52.61	-4.75	UK	2	25.00	sand, stones, shells
232	St Gowan Shoals	51.54	-4.96	UK	5	6.40	sand, shells
233	Helwick Sands	51.53	-4.30	UK	14	1.30	sand, shells
234		51.51	-4.32	UK	18	28.00	sand, shells
235		51.44	-4.48	UK	1	25.00	sand
236		51.42	-4.42	UK	1	30.00	sand
237		51.40	-4.47	UK	1	23.00	sand
238		51.40	-4.39	UK	1	21.00	sand
239		51.46	-4.42	UK	11	24.00	sand
240		51.45	-4.28	UK	20	26.00	sand, stones
241	White Oyster Ledge	51.51	-3.99	UK	13	8.50	pebbles, sand, mud, shells
242		51.30	-4.50	UK	35	13.90	pebbles, coarse sand, gravel
243		51.35	-4.79	UK	3	44.00	coarse sand
244	Stanley Bank	51.22	-4.60	UK	5	8.20	sand, shells
245	North West Bank	51.18	-4.72	UK	6	12.80	sand

ID	Name	Lat. (°N)	Long.	Jurisd.	Site area (km^2)	Mid point water depth (m)	Sediments
246	East Bank	51.17	-4.63	UK	4	14.30	sand, shells
247	Bais Bank	51.95	-5.36	UK	22	10.00	gravel, sand, shells
248		51.78	-5.58	UK	14	43.00	sand, gravel
249		51.59	-5.38	UK	4	41.00	sand, shells, mud
250		50.89	-4.68	UK	9	29.00	sand
251	Cape Cornwall Bank	50.20	-5.83	UK	7	27.00	sand, stones, shells
252		50.21	-5.92	UK	14	29.00	sand, shells
253		50.82	-8.90	Ireland	23	93.00	sand
254		50.87	-8.27	Ireland	112	73.00	sand
255		50.80	-7.75	Ireland	215	71.00	sand
256		50.75	-8.20	Ireland	14	91.00	sand
257		50.70	-8.90	Ireland	83	88.00	fine sand
258		50.57	-9.38	Ireland	98	97.00	sand, stones, shells
259		50.40	-9.65	Ireland	23	95.00	sand, stones, shells
260		50.30	-9.23	Ireland	21	93.00	fine sand
261		59.49	-8.80	UK	27	86.00	fine sand
262		50.54	-8.54	Ireland	64	88.00	sand
263	Labadie Bank	50.55	-8.17	Ireland	555	75.00	sand, fine sand
264	West Bank	50.22	-8.65	Ireland	616	95.00	sand
265	North West Bank	50.18	-7.68	UK	931	77.00	coarse sand, broken shells
266	Jone's Bank	49.82	-8.00	UK	257	73.00	fine sand
267		49.84	-8.48	UK	45	88.00	fine sand
268		49.74	-8.83	UK	125	73.00	sand
269		49.65	-6.91	UK	3	89.00	sand, stones
270		50.02	-5.95	UK	33	37.00	sand, pebbles, broken shells
271		49.92	-5.27	UK	2	32.00	sand, shells, small gravel
272		49.91	-5.25	UK	1	47.00	sand, shells, gravel
273		49.45	-5.46	UK	4	96.00	sand, gravel, shells
274		50.18	-3.91	UK	1	23.00	sand, stones
275		50.16	-3.89	UK	1	25.50	sand, stones
276	Skerries Bank	50.25	-3.60	UK	12	3.30	sand
277		50.25	-3.51	UK	1	36.00	sand, shells
278		50.25	-3.52	UK	1	48.00	sand, shells
279		50.24	-3.00	UK	10	45.00	gravel, sand, shells
280		50.27	-2.97	UK	6	42.00	gravel, sand, shells
281		50.30	-2.97	UK	2	43.00	gravel, sand, shells
282		50.33	-2.93	UK	69	32.00	gravel, sand, shells
283		50.27	-2.87	UK	88	38.00	sand, gravel, shells
284		50.22	-2.87	UK	17	45.00	sand, gravel, shells
285		50.17	-2.93	UK	25	42.00	sand, gravel, shells
286	Dolphin Bank	50.67	-1.64	UK	1	5.80	fine sand
287	Ryde Middle	50.77	-1.23	UK	4	3.40	mud, sand,

ID	Name	Lat. (°N)	Long.	Jurisd.	Site area (km^2)	Mid point water depth (m)	Sediments
	Ground						gravel
288		50.57	-1.25	UK	1	15.40	fine sand, broken shells
289		50.76	-1.16	UK	1	16.60	mud, sand, shingle
290	Medmerry Bank	50.71	-0.84	UK	2	3.70	fine sand
291		50.56	-1.16	UK	25	15.00	broken shells, stones, gravel
292		50.64	0.00	UK	1	27.50	fine sand, broken shells
293		50.58	0.26	UK	1	49.00	fine sand, broken shells, spebbles, weed
294		50.58	0.29	UK	4	46.00	sand, broken shells, small gravel, pebbles
295		50.68	0.39	UK	1	18.20	sand, broken shells gravel, pebbles
296		50.68	0.43	UK	4	14.80	broken shells, small gravel, pebbles
297	Long Sand	50.75	0.41	UK	2	5.60	sand
298		50.77	0.42	UK	3	7.60	sand, broken shells
299	Four Fathoms Sand Ridge	50.81	0.63	UK	10	5.70	fine sand, broken shells
300		50.85	0.86	UK	1	17.80	sand
301		50.86	1.12	UK	1	28.50	sand, broken shells, stones
302		50.86	1.16	UK	2	28.50	sand, shells, stones
303	Bullock Bank	50.75	1.07	UK	12	14.70	sand, broken shells, small gravel, pebbles
304	Bassurelle	50.60	1.08	F?	48	6.80	sand, broken shells
305		50.56	1.05	F?	8	25.00	fine sand
306		50.55	1.08	F?	2	25.00	fine sand
307		50.55	1.12	F?	1	27.00	fine sand
308		50.66	1.29	F?	33	26.00	gravel
309	Vergoyer	50.52	1.20	F	122	11.00	fine sand, gravel
310	Bassure de Baas	50.50	1.41	F	170	5.50	fine sand, gravel
311		50.37	1.03	F	5	17.00	gravel
312	Battur	50.40	1.37	F	72	8.90	sand, broken shells
313	The Ridge or Le Colbart	50.88	1.33	UK?	28	1.60	sind, fine sand
314	Les Ridens	50.75	1.29	F	37	15.00	sand, shells
315		49.55	0.02	F	2	2.30	sand, broken shells
316		49.59	-0.16	F	2	17.00	sand, gravel, shells
317	Banc de Seine	49.47	-0.25	F	0	12.20	sand
318	Bank du Cardonnet	49.46	-1.08	F	16	5.10	sand
319	Banc de St Marcouf	49.51	-1.16	F	2	2.90	sand
320	Banc de la Rade	49.54	-1.22	F	4	4.70	sand

ID	Name	Lat. (°N)	Long.	Jurisd.	Site area (km^2)	Mid point water depth (m)	Sediments
321	Alderney Banks	49.68	-2.20	Guernsey?	2	11.00	sand
322	Casquet SSE Bank	49.68	-2.30	Guernsey?	26	8.50	sand
323	Middle Bank	49.71	-2.38	Guernsey?	3	27.50	sand, shells
324	Casquet SSW Bank	49.68	-2.38	Guernsey?	6	25.70	sand, fine sand
325	Casquet SW Bank	49.67	-2.13	Guernsey?	2	12.80	sand
326		49.62	-2.26	F?	2	29.30	sand, stones
327	Banc de la Schole	49.58	-2.22	Guernsey?	8	2.40	sand
328		49.35	-2.25	Guernsey?	2	22.00	sand, gravel, shells
329	Rigdon Bank	49.25	-2.29	F	2	3.40	sand
330	Banc de la Corbiere	49.90	-1.91	F	18	8.80	sand
331	Bancs de Sable	48.82	-2.82	F	17	5.50	sand, gravel, shells
332	Banc Maurice	48.96	-2.93	F	2	12.80	gravel
333		49.07	-2.97	F	5	44.00	gravel, shells
334		49.11	-3.00	F	7	5.30	sand, shells
335		49.51	-3.07	F	15	55.00	rock, covered with gravel
336	Banc des Langoustieres	49.28	-3.33	F	6	35.00	coarse sand, shells
337		48.97	-4.75	F	20	88.00	fine sand
338	Banc du Four	48.53	-4.89	F	6	36.60	sand
339	Haut Fond d' Ouessant	48.38	-5.16	F	2	44.00	gravel, shells
340		48.02	-5.25	F	2	36.00	sand, broken shells
341	Parson's Bank	48.43	-6.57	F	0	117.00	sand, shells
342	Kaiser I Hind Bank	48.12	-6.58	F	0	117.00	sand, broken shells
343	Banc de Quiberon	47.49	-3.04	F	2	6.90	mud, sand
344	Banc de Kerouars	47.10	-2.24	F	6	2.30	sand
345		45.99	-1.50	F	2	13.20	sand
346	Bajo Castro Verde	43.54	-3.22	E	2	53.00	stones
347		43.44	-3.29	E	2	46.00	gravel
348	Bajo el Doble	43.50	-3.45	E	1	13.00	stones
349		43.54	-3.47	E	1	47.00	stones
350	Bajo el Castro	43.51	-3.64	E	2	100.00	sand
351	Bajo Maruca	43.65	-3.66	E	18	42.00	stones
352	Cabezo de Tierra	43.52	-3.85	E	1	17.00	stones
353	Bajo del Castro	43.52	-3.91	E	1	39.00	stones
354	Bajo Juan de Ambojo	43.52	-3.96	E	1	34.00	stones
355	Bajo Cadramon	43.50	-4.01	E	1	50.00	stones
356		43.69	-4.03	E	16	835.00	mud
357	Cabezo Coraje	43.52	-4.00	E	49	66.00	stones
358	Bajo Torriente	43.46	-4.23	E	1	22.00	stones
359	Bajo Luana	43.44	-4.26	E	1	26.00	stones
360		43.97	-4.46	E	130	340.00	mud, sand
361		43.58	-5.66	E	1	14.20	stones
362		43.64	-5.99	E	1	43.00	stones
363		44.07	-5.96	E	13	353.00	sand, gravel
364		43.87	-6.18	E	7	150.00	stones, sand, algae
365	El Serron	43.63	-6.56	E	3	39.00	stones
366		43.67	-6.86	E	4	97.00	stones

ID	Name	Lat. (°N)	Long.	Jurisd.	Site area (km^2)	Mid point water depth (m)	Sediments
367		44.09	-7.05	E	43	115.00	sand
368		43.78	-8.03	E	1	48.00	stones
369		44.08	-7.94	E	4	183.00	sand
370	Bako Niebla	43.82	-8.10	E	3	59.00	gravel
371		45.54	-2.77	F	10	75.00	gravel, broken shells
372		45.50	-3.28	F	11	97.00	gravel, broken shells
373	Galicia Bank	42.67	-11.74	E	2200	759.00	sand, mud
374	Gettysberg or Gorringe Bank	36.67	-11.75	P	1916	23.00	sand, mud
375	Cabezo de Lage	43.25	-9.08	E	1	48.00	sand
376	Las Baleas	43.20	-9.21	E	1	12.20	stones
377	Las Quibrantes	43.14	-9.24	E	2	0.10	stones
378	Leixon de Juanboy	43.12	-9.26	E	1	8.80	sand, stones
379		42.82	-9.19	E	2	4.80	sand
380	Bajo de los Meixidos	42.76	-9.20	E	11	2.80	sand
381	La Baya	42.70	-9.67	E	5	1.80	stones
382		42.66	-9.07	E	1	11.00	gravel
383	Bco. las Basonas	42.63	-9.09	E	5	6.50	gravel
384	Las Pozas	42.56	-9.20	E	4	29.00	stones
385	Ba. De Corrubedo	42.54	-9.11	E	4	1.70	sand, stones
386	Bco. Del Praquiero	42.51	-9.08	E	4	9.00	sand
387		39.26	-9.60	P	2	42.00	fine sand, sand, broken shells
388		38.80	-9.77	P	10	43.00	fine sand
389		38.77	-9.75	P	14	43.00	fine sand
390		37.21	-8.95	P	2	42.00	sand
391		37.17	-9.00	P	5	43.00	sand
392	Banco del Hoyo	36.09	-6.27	E/P	25	20.00	sand
393		36.13	-6.22	E	4	14.00	sand, gravel
394		36.11	-6.16	E	4	14.90	sand
395	Banco de Trafalgar	36.14	-6.12	E	12	12.50	sand
396	Placer de Meca	36.19	-6.11	E	11	6.10	sand
397		36.15	-6.26	E	1	17.00	sand
398	The Ridge	35.92	-5.92	E	93	62.00	gravel
399	Banco del Oeste	36.02	-5.75	E	1	17.00	sand, stones
400	Los Cabezos	36.02	-5.71	E	5	4.80	stones
401	Placer Nuevo	36.01	-5.72	E	2	12.00	stones

3.2 Example cases for different types of submerged sandbanks (full list see Vol. V)

In this section, the environmental characteristics of 2 banks are presented in more detail, information gained mainly from published scientific literature. The 2 banks chosen were: Helwick Sands (Bristol Channel, UK) and Kwinte Bank (Southern Bight of the North Sea, Belgium). A third type of bank will be presented in Volume III, Mediterranean. Each of these banks is representative of a particular type of continental shelf banks, i.e. headland-associated active banks (Type 3A of Dyer and Huntley, 1999), open shelf active banks (Type 1 of Dyer and Huntley, 1999)) and open shelf relict banks; thus, each is controlled by different mechanisms of development and maintenance. Moreover, as these banks are associated with different environmental characteristics (hydrodynamics, temperature, turbidity, nutrient inputs etc.), they are representative of different habitats. Therefore, it is considered a useful exercise to compare their sedimentary and ecological character. In addition, presentation of the information in this manner (see below) exemplifies the potential availability of data from some of the banks of the European waters; for others, detailed surveys might need to be undertaken, in the future.

3.2.1 Helwick Sand (UK)

Site name **Helwick Sand**
ID 233
Morphology The Helwick Sands (ESSD ID 233) is the westernmost of the major sandbanks of the Bristol Channel, UK (Fig. 3.2.1.1). It is an isolated, asymmetric sandbank (Britton and Britton, 1979), which is located adjacent to the Gower Peninsula. The main axis of the bank has an E-W orientation. The bank is approx. 14 km long, 1-2 km wide and extends to a maximum height of 30 m above the surrounding seabed.

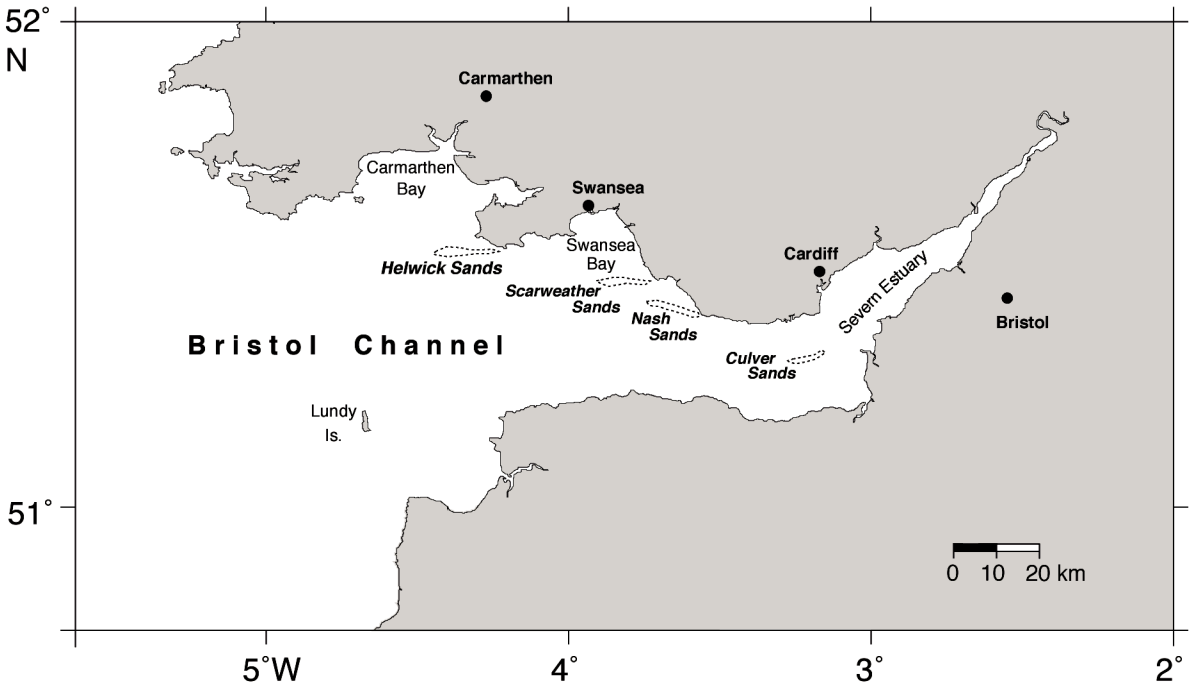


Fig. 3.2.1.1: Location of the Helwick Sands

Hydro-dynamic regime The Bristol Channel/ Severn Estuary system is associated with one of largest tidal ranges in the world, reaching up to 13 m at the head of the Severn Estuary. The tidal currents in the Bristol Channel itself are mostly rectilinear (Britton and Britton, 1979; Posford Duvivier, 1999). In the area of the Helwick Sands, the flow is highly energetic and sub-parallel to the axis of the bank however, the currents have been observed to veer along the water column and the near-bed currents flow across the bank, particularly during the late flood (Britton 1978). The magnitude and duration of the ebb and flood currents are different on each side of the bank (Collins *et al*., 1979; Harris and Collins, 1984), resulting in tidal flow asymmetries: the flood stream is dominant along the northern flank, whereas the ebb flow predominates along the southern flank. These eddy-like flow patterns have a significant effect upon the local sediment transport pathways. The Helwick Sands are exposed to the prevailing swell from the southwest (with a period between 5 and 12 s). The bank is also exposed to storm waves, which effectively limit the height of the structure by eroding material from the bank's crest.

Sediments The surficial sediments of the bank consist mainly of sub-rounded to sub-angular medium-sized quartz sand (Britton and Britton, 1979), with the carbonate content of the sediments being very small (Tyler and Shackley, 1979). The sediments are generally well sorted on the bank, but the grain size and sorting are spatially variable. Generally, the mean size decreases along the bank in a westerly direction. The seabed

sediments to the north of the bank, consist also of well sorted, medium sand (Al Ghadban, 1986); the seabed sediments to the south of the bank, however, are significantly coarser, consisting of a mixture of sands, gravels and stones (with a diameter of up to 24 cm) (Tyler and Shackley, 1979). These coarse sediments on the seabed are considered to be associated with an abundant epifauna, given that, due to their large size and considerable water depths, they are very rarely mobile (Britton and Britton, 1979).

Extensive bedform (subaqueous dune) fields are associated with the bank. The size of the bedforms increases with the water depth, with the larger dunes found over the lower slopes of the bank. The dune crests are aligned almost perpendicular to the prevailing tidal currents, but the dune direction of asymmetry (i.e. the direction of the steeper (lee) slope) is spatially and, in many cases, temporally variable (Harris and Collins, 1984). The presence of the dunes and the sensitivity of their morphological characteristics to the fluctuations of the tidal flow suggest that the bank's sediments are mobile under the tidal currents.

Formation and maintenance

The formation of Helwick Sands is considered to have commenced during the sea level rise (Flandrian Transgression), which followed the last glacial period (Culver and Bull, 1979). During the sea level rise, large quantities of previously deposited sediments were eroded at the leading edge of the transgression. As the area started to be subjected to an energetic hydraulic regime (waves and currents), most of the fine-grained sediments were winnowed away, leaving behind a coarse sediment lag which formed the basal layers of the Bristol Channel deposits (Britton and Britton, 1979). Offshore sand-sized sediments (from the Celtic Sea) were also transported into the area, particularly towards the northern side of the Bristol Channel (Culver, 1979). This material fashioned a mobile sand layer, which then formed the large sedimentary accumulations (sandbanks and bedform fields) of the area, through its interaction with the modern hydrodynamic regime.

The Helwick Sands together with the other linear banks of the region are situated in areas where the width of the Bristol Channel increases abruptly; thus, it is probable that their formation has been (at least, partially) controlled by the morphology of the coastline. The widening of the channel causes the ebb tidal flow deceleration, thus favouring sediment deposition at these particular locations. In addition, the Helwick Sands, Nash Bank and Scarweather Sands all lie close to headlands. The tidal flow interaction with these coastal features results in the development of residual flow eddies and sediment transport cells which may be responsible for the bank formation (Pattiaratchi, 1985). The presence and morphological characteristics (asymmetry) of the large subaqueous dunes found around the Helwick Sands support such sediment transport patterns indicating clockwise sediment pathways around the bank (Harris and Collins, 1985). This circulation may control the bank's maintenance, with the tidal currents circulating sediments around the bank (and obliquely towards the crest) (Britton and Britton, 1979). The shallow water depth above the bank's crest suggests that energetic waves are likely to re-suspend the crest's sediments and, thus, control the vertical growth of the bank.

Ecology

The benthic communities of the Bristol Channel have been investigated by Warwick and Davies (1977). It was shown that (a) the faunal diversity decreases upstream; and (b) the substrate type has a profound effect on community distribution. The ecology of the banks themselves has been relatively neglected. However, the benthic communities of Helwick sands have been studied by Tyler and Shackley (1979). The faunal diversity was found to be generally poor, particularly at the crest of the bank, where only 3 species were found: the amphipod *Pontocrates arenarius,* the polychaete *Nephthys cirrosa* and the mysid *Gastrosaccus spinifer.* The latter species was, in fact, more abundant on the bank than on the surrounding seabed. This difference may be the result of its ability to burrow rapidly into the substrate if disturbed (Ramussen,

1973), which makes it ideally suited to inhabit the mobile sediments of energetic environments normally associated with sandbanks. With regard to *Nephthys cirrosa*, its long setae enables it to feed, whilst remaining buried deep in the sand (Tyler and Shackley, 1979). I

t has been argued that as Helwick Sands is associated with a high-energy regime (and, thus, mobile sediments), it can support only reduced *Spisula* (trough shell) sub-communities of poor faunal diversity (Posford Duvivier, 1999). This appears to be a common characteristic of most of the offshore banks of the Bristol Channel, but cannot be applied to all banks situated in energetic environments, as shown by the very different ecology of Kwinte Bank (see Section 4.3). Hence, other environmental factors, such as water turbidity, nutrient inputs, water depth and condition of the seabed may be additional factors influencing the habitat of the bank.

Human Impacts

Extraction of sand and gravels from sandbanks and other areas of the seabed can have a large effect on the local benthic communities. Therefore, as Helwick Sands is licensed for the dredging of marine aggregates, it is expected that the dredging, to some extent, will influence the local and coastal benthic communities. According to the regulatory procedures currently in force (i.e the Government View Procedure DETR, 1999)), environmental impact assessment and monitoring of the dredging effects have been, or are being, carried out in the area. Unfortunately, the data and findings of these surveys are, in most cases, confidential and at present not available.

3.2.2 Kwinte Bank (Belgium)

Site name **Kwinte Bank**
ID 8

Morphology The Kwinte Bank (ESSD No. 8) is situated Approx. 12 km off the Belgian coast (Fig. 3.2.2.1) and is one of the Flemish Banks, a group of NE-SW trending linear banks found offshore of the Belgian Coast. These banks are separated from each other by channels that have maximum depths of about 30m below MSL.

The Kwinte Bank is about 20 km long and 2 km wide and has a height relative to seabed of some 10 to 20 m (with its crest rising up to 5-6 m below the sea surface). It is characterised by transverse asymmetry, with its steeper slope facing towards the NW (De Moor, 1989). The channels, which delimit the bank, have varying depths, being deeper along the northwestern flank (the offshore flank).

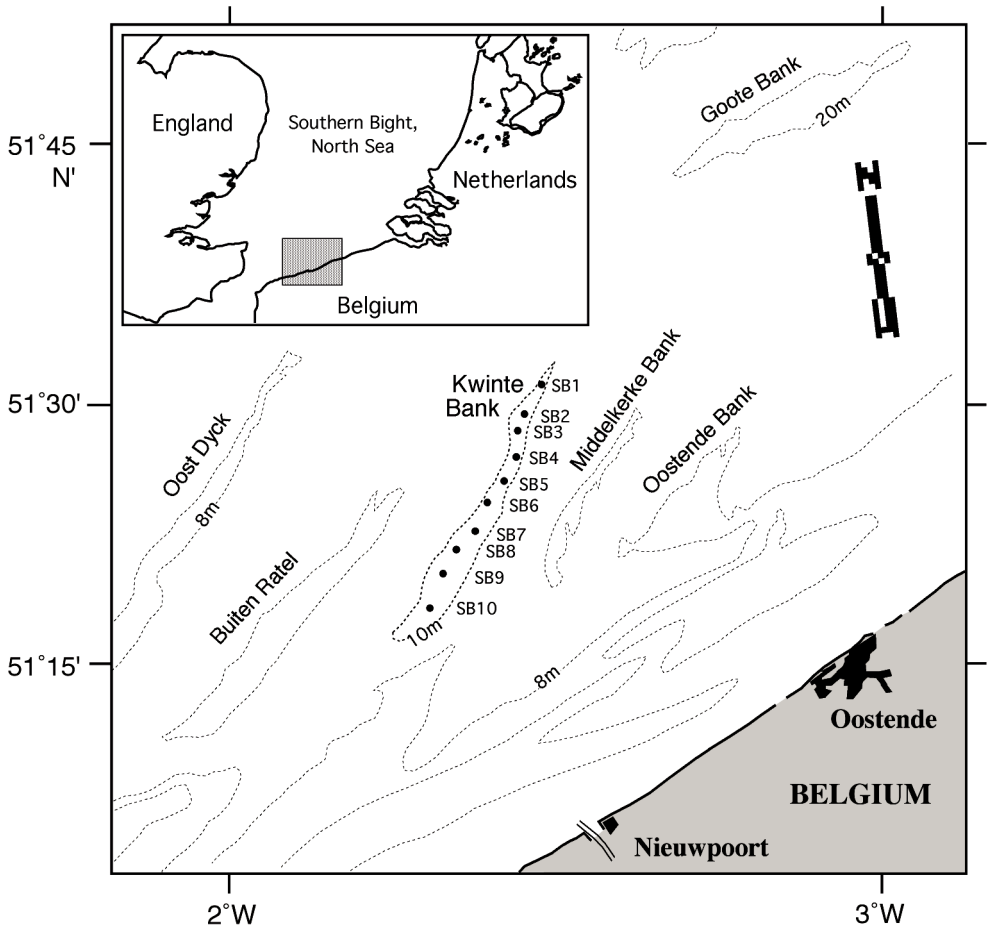


Fig. 3.2.2.1: Location of the Kwinte Bank (Belgian Continental Shelf). The sampling stations referred in the text are also shown. Modified after Vanosmael *et al*. (1982).

Hydro-dynamics The tides around the Kwinte Bank are semidiurnal and within the low macrotidal range, i.e. between 2.2 m and 5 m on neaps and springs, respectively (Van Lackner, 1999). The average tide corresponds to an elongated ellipse, the major axis of which is oriented SW-NE, i.e. sub-parallel to the bank's axis (20° clockwise). Close to the bank's crest, peak currents at 2 m above the seabed reach speeds of up to 75 cms^{-1} on springs and 40 cms^{-1} on neaps, with the flood currents being dominant (Van

Wesenbeeck and Lanckneus, 2000). Although there is no accurate information on the wave regime of the bank itself, the area is likely to be subjected to strong wave action: significant wave heights in excess of 4 m (with a period of about 7 s) have been recorded in the area (Houthouys *et al*., 1994; Vincent *et al*., 1998).

Sediments

The surficial sediments of the bank consist of fine to coarse-grained sands. The mean size of the sediments changes from ~0. 22 mm in the southwest, to ~0.40 mm in the northeast (Lanckneus, 1989). The silt-clay content decreases from the southwest to the northeast, whereas the coarser sediments are generally found close to the bank's crest (Gao et al. 1994). In comparison, the adjacent channels (swales) consist of mixed sediments, with the more inshore swale (the Negenvaam Swale) characterised by generally finer and better sorted sediments (from ~0.20 to 0.30 mm) than the offshore swale (Kwinte Swale) with a (sediment mean size of between 0.21 to 0.60 mm). The biogenic component ($CaCO_3$) of the sediments is much higher within the offshore Kwinte Swale (being between 13 and 42% of the total sediment weight), than within the inshore Negenvaam Swale (9 to 17% of the total weight). The sediments on the bank itself have also a large range $CaCO_3$ contents (7 to 32 %) (Lanckneus, 1989).

Extensive fields of sedimentary bedforms (subaqueous dunes) occupy the Kwinte Bank (Lanckneus and DeMoor, 1991; Gao *et al*., 1994; Van Wesenbeeck and Lanckneus, 2000)), as shown also on. Very large subaqueous dunes (with wave lengths of more than 300 m and heights of up to 8 m) are found mostly on the flanks and the crest of the bank, but they are very rare within the adjacent swales (Van Wesenbeeck and Lanckneus, 2000. The cross-sectional asymmetry of these bedforms (~80° N) is well correlated to the dominant tidal currents (flood currents), suggesting tidal flow control. In comparison, the cross-sectional asymmetry of the smaller dunes can be either flood or ebb oriented, trending at ~45 - 225° N. Comparison between different data sets collected over the area (e.g. Gao *et al*., 1994; Van Wesenbeeck and Lanckneus, 2000) show that the smaller dunes change their cross-sectional asymmetry during the tidal cycle, suggesting tidally-induced movement of the bed sediments. In comparison, the larger dunes appear to be less sensitive to the fluctuations of the tidal flow, but there is evidence to suggest that high wave activity may affect their morphology (Lanckneus and DeMoor, 1991). During storms, the entire surface of the bank may be destroyed (Houbolt, 1968).

Formation and maintenance

Marine geophysical data suggest that the Kwinte Bank consist of relatively thick, mostly sandy Quaternary sediments. The bank's internal architecture is complex, as several seismostratigraphic units (and unconformities) can be identified (De Moor, 1989), with the younger sediments resting on several low sub-bank cores. There is an absence of detailed information, however, which prevents gaining a better insight into the bank's formative processes. Nevertheless, as its internal architecture seems very similar to that of the neighbouring Middelkerke Bank (the immediately inshore bank of the Flemish Bank Group), the long-term evolutionary model suggested for Middelkerke Bank might also apply to the Kwinte Bank. According to this model (Berne *et al*., 1994), the Middelkerke Bank represents a complex assemblage of depositional units, resulting from the deposition of sediments (in different temporal scales) supplied by the reworking of the underlying deposits. The lower units (core) of the bank have been thought to relate to processes taking place closer to coasts, consisting of tidal ebb-delta and/or intertidal deposits; these sediments were deposited during lower sea levels, i.e. before the end of the Flandrian Transgression. In comparison, the upper units are likely to have been deposited after the stabilisation of the sea level, being 'modern' deposits; as such are controlled by the present hydrodynamic regime.

The recent evolution and maintenance of the Kwinte Bank appears to be the result of an interplay between the tidal and wind and wave-induced flows. The large erosional surfaces (major bounding surfaces or unconformities) observed within the bank

suggest major erosion during highly energetic events. As it has been observed in the neighbouring banks, major morphological and sedimentological reconstruction of their shallow crests may occur during high wind and wave activity (e.g. Trentesaux *et al*., 1994; Houthuys *et al*., 1994). Such events may also be associated with large sediment fluxes (Vincent *et al.*, 1998), which are likely to define the residual sediment transport. The direction of this transport depends not only on the tidal flow asymmetries, but also on the resultant vector of the combined flows. There is evidence to suggest that, during highly energetic events, bed material is eroded from the crest of the bank to be subsequently deposited lower in the slopes (De Moor, 1989).

An interesting characteristic of the sediment transport patterns of the Kwinte Bank is the relative immobility of the sediments of its crest under tidal flow alone. Estimations of the sediment mobility, carried out in the course of the present study, have shown that the average tidal flow can not initiate movement of the bed material, which can move only during the most energetic periods of the neap-spring cycle. This is confirmed by the intriguing patterns of the cross-sectional asymmetry of the small and medium dunes (Ga° *et al*., 1994; Van Wesenbeeck and Lanckneus, 2000). Under the influence of strong wave activity, however, not only large quantities of sediments can move along the bed, but also resuspension of the finer fractions of seabed sediments may occur (see also Vincent *et al*., 1998). This pattern of movement may have significant effects not only on the sedimentary processes of the bank, but also on the benthic communities.

Ecology

The Flemish Banks may be considered as 'islands' consisting of coarser sediments, in an area of the seabed characterised by fine (muddy) sediments. Within an ecological context, these isolated accumulations of coarse sediment may constitute important habitats (Vanosmael *et al*., 1982). However, whilst the benthic fauna of the region has been the subject of intensive research since 1970, the sandbanks themselves were rarely studied until commercial interests in aggregate extraction began in the area.

Biological surveys of the Flemish Banks were undertaken between 1977 and 1978, to provide information for Environmental Impact Assessment (EIA) exercises. The data collected were used to study the community structure and species diversity of the banks themselves and their interrelationships with the benthic fauna of the surrounding seabed. The Kwinte bank was surveyed during September 1978. Seabed sampling was carried out at 10 sites along the bank (Fig. 3.2.2.), in order to investigate species diversity and community structure (Vanosmael *et al*., 1982). Details on the surficial sediments and biology (macro and meiofauna) are summarised below.

The surficial sediments were found to be well sorted, with the median particle diameter of the sand fraction varying between 0.183 and 0.645 mm. The surficial sediments ranged from medium-coarse sand (at Stations SB2, SB3, SB4, SB5 and SB6) and finer deposits (at Stations SB1, SB7, SB8, SB9 and SB10). The gravel content on the Kwinte Bank has been found to reach values up to 11%, whereas the mud/organic matter content did not exceed 5%.

Macrofauna: species abundance and composition

The macrofaunal density varies from 500 to 15330 individuals/ m^2 at Station SB8 and Station SB4, respectively (Vanosmael *et al*., 1982). Areas of coarser sediment showed greater density of organisms, whereas the lowest densities were recorded in the finest sediments. Despite a general lack of information regarding the macrobenthos of sandbanks, it would appear that the Kwinte Bank is associated with relatively high macrofaunal densities. Govaere *et al*. (1980) identified 3 distinct regions of macrofaunal densities in the Southern Bight of the North Sea: (i) an open sea zone

(typical densities of ~2100 individuals/m^2); (ii) a transition zone (typical densities of 1600 individuals/m^2) and; (iii) a coastal zone. The Kwinte Bank is located within the second (transition zone), but the macrofaunal densities appear to be extremely high, higher than those recorded in the open sea zone (Vanosmael *et al*., 1982).

Some 62 species were identified on the Kwinte Bank, 37 species of Polychaeta, 17 species of Crustacea, 12 species of Mollusca, 4 species of Archannelida and 3 species of Echinodermata (Vanosmael *et al*., 1982). Polychaetes, which were found to be the dominant species, represent between 44% (Station SB7) and 83% (Station SB5) of the total. The interstitial polychaete *Hesionura augneri* was found to be the most common species, representing ~55% of the total macrofauna; its highest densities were observed in the coarse sediments, but it was seen also in fine sands. *Sphaero syllise*, *Microphthalmus listensis* and *Nephtys cirrosa* were also common, with the latter species found at all stations; this species is known to prefer high-energy environments (see Hammond, 1966). It has to be noted that *Nephtys cirrosa* was one of the few species identified on Helwick Sands (see Section 4.2.5). Interstitial polychaetes appear to thrive on the Kwinte Bank, due to their ability to withstand the extreme disturbances caused by the tidal, wind- and wave-induced flows; in contrast, tube building species are virtually absent from the area.

The most abundant crustaceans are *Tanaissus lilljborgi* and *Bathyporeia elegans*; both species appear to favour fine-grained sediments. At Station SB8, crustaceans were found to dominate with a relative abundance of 64%. Two important species of archannelida (*Polygordius appendiculatus* and *Protodriloides chaetifer*) were recorded also on the bank. The former, was associated mostly with coarse and medium sands, whilst the latter did not show a preferred (in terms of grain-size) habitat (Vanosmael *et al*., 1982). The mollusc, *Spisula solida,* a well-known inhabitant of sandy substrates (Tebble, 1966), was the most abundant on the Kwinte Bank; its highest densities were found at Stations SB3 and SB4 (Fig. 3.2.2.1).

In general, the Kwinte Bank appears to be characterised by a high number of species (28sp/m^2); in this sense, it is comparable to the open sea environments of the Southern Bight of the North Sea (23sp/m^2). The species diversity, however, is much lower than that of the deeper areas of the open sea environments (Govaere *et al*., 1980; Vanosmael *et al*., 1982). This difference may be explained by the harsh conditions of the bank environment, which reduces species diversity.

Meiofauna: species abundance and composition

Meiofaunal densities on the Kwinte Bank vary between 186 and 1234 individuals/10cm^2 at Station SB8, and Station SB1 (Willems *et al*., 1982a). Nematodes appear to dominate, representing 60% of the total meiofauna, harpaticoid copepods account for 34% and other taxa (Annelida, Ostracoda, Halaccinida and Hydrozoa) make up the remaining 6%. At Stations SB1, SB2, SB4, SB6, SB7 and SB8, nematodes predominate (comprising over 50% of the total population), whereas at Stations SB3, SB5, SB9 and SB10, copepods are more abundant (Willems *et al*., 1982a). Nematodes and copepods have average densities (for the whole bank) of 366 individuals/10cm^2 and 161 individuals/10cm^2, respectively. Nematode densities are low (in excess of 1000 individuals/10cm^2) as compared with those of the surrounding (deeper) area (Govaere *et al*. 1982).

A total of 136 species of nematodes were identified on the bank (Willems *et al*., 1982a). It is possible to group the stations into three clusters, in terms of species distribution: Group 1 (Stations SB2, SB3, SB4 and SB5); Group 2 (Stations SB1 and SB6); and Group 3 (Stations SB7, SB8 SB9 and SB10). Group 1 showed an abundance of nematodes (Desmodorida, Epsilonematidae and Draconematidae), whereas Group 2 was dominated by Chromadorida and Group 3 had a relatively high

content of Areodaimida and Monhysterida. The three different nematode associations correspond to the different sediment types found on the Kwinte Bank. Whilst it is possible to loosely group these animals according to substrate type, there is no correlation between species and grain size. It has to be noted that the abundance of Epsilonematidae and Draconematidae nematodes is unusual for offshore communities but, as these nematodes are well suited for living in highly energetic environments, their presence on the bank is not surprising. The relative abundance of Areodaimida and Monhysterida in Groups 2 and 3 is consistent with previous observations of nematodes in fine/ sandy substrates. (McIntyre and Murison, 1973).

Nematodes can be classified into four feeding groups (Wieser, 1953): selective deposit feeders (1A); non-selective deposit feeders (1B); epigrowth feeders (2A); and omnivorous feeders (2B). No dominant feeding type has been identified on the Kwinte Bank. However, a fairly high percentage of 1A feeders was observed. This may be explained by the unusually large number of interstitial Areodaimida and Monhysterida members (Willems *et al*., 1982a). The fact that all trophic groups of nematodes are equally distributed in the sediment indicates a heterogeneous (multi-niche) environment. The nematode diversity on the Kwinte Bank is higher than in other areas of the Southern Bight of the North Sea; this is mainly due to the variety of microhabitats associated with the surface of an active sandbank.

Copepod species, 65 harpaticoid and 1 cyclopoid, have been identified on Kwinte Bank (Willems *et al*., 1982a). The former belongs to eight families and is essentially characterised by mesospammic forms. The diversity is higher at Stations SB2, SB3, SB4 and SB5 (52 species), where the sediments are coarser (sands, gravels and shells) and dominated by three harpaticoid and one cyclopoid species, in particular, *Interleptomesochra eulittoralis*, being the most abundant species. In areas characterised by finer-grained sediments (such as at SB2) 29 species were identified, *Leptastacus laticaudatus intermedies* was the most abundant. In the finest sands, most of the copepod species belong to the Cylindrodspillidae and Paramesochridae families. In areas with coarser sediments (median sizes greater than 0.3 mm), members of the Ameiridae, Ectinosomatidae and Diosaccidae families become more abundant. The species diversity of the Copepoda varies between 1.2 bits/ind and 3.2 bits/ind (Willems *et al*., 1982b), with the highest values observed in Station SB1. In general, both the diversity and the number of species are higher in the coarser sediments of the northern extremity of the bank.

Concluding remarks

The clear sediment grain-size gradient of the Kwinte Bank appears to have a significant influence on the benthic communities, with total macrofaunal densities increasing with increasing grain-size (Vanosmael *et al*., 1982). The interstitial polychaete *Hesionura augneri* is the most dominant species on the bank, particularly in the coarser sediments. In contrast, small crustaceans (e.g. *Bathyporeia elegans*) dominate over the southern end of the bank (Vanosmael *et al*., 1982). The diversity of macrofaunal species is low, reflecting the stressed nature of the environment. Species diversity decreases with increasing grain-size, mainly due to the abundance of *Hesionura augneri.* The macrobenthic fauna of the Kwinte Bank is clearly related to that of the open sea zone, of the Southern Bight of the North Sea (Govaere *et al*. 1982).

Total meiofaunal densities do not show any trends, or correlation, to the sediment grain-size (Willems *et al*., 1982b). Nematodes and harpaticoid copepods were found to dominate. Nematodes are evenly distributed over the bank, but their abundance is low. Species diversity, on the other hand, is high (Willems *et al*., 1982a). The density of the copepod species found on the Kwinte Bank is not significantly influenced by sediment size, but species diversity was found to increase with increasing grain-size (Willems *et al*., 1982a). Also, similar to macrofaunal distributions, the harpaticoid copepod associations were more closely correlated with those of the open sea zone rather than the transition zone in which the bank is situated (Willems *et al*. 1982a).

Generally, it appears that the Kwinte Bank represents a unique habitat, supporting species that can survive in harsh sedimentary environments. The bank may be considered as a *biogeographical island*, as both its sedimentological characteristics and benthic fauna are very different from the surrounding area of the Southern Bight. The general lack of information on the benthic communities of the remainder of the Flemish Banks does not allow the generalisation of this observation. However, it appears likely that the rest of the banks are associated with similar benthic communities.

Human impacts

The Flemish Banks are very important marine aggregate resources for Belgium and, as such, have been exploited. However, the effect of the dredging activities has not yet been defined accurately, although large programmes of benthic community monitoring are underway (Van Lancker, pers. comm.). The long-term effect of such activities will be monitored in this very interesting environment.

3.3 Bibliography submerged sandbanks

Al-Ghadban, A. N., 1986. Sediment Transport in Carmarthen Bay (Northern Bristol Channel). Ph.D. Thesis, Department of Oceanography, Swansea, University Of Wales. 371 pp.

American Geological Institute, 1974. Dictionary of Geological Terms. National Academy of Sciences, Anchor Press/Doubleday, New York.

Berne, G., Auffret, J.P. and Walker, P., 1988. Internal structure of subtidal sandwaves revealed by high resolution seismic reflection. Sedimentology, 35, 5-20.

Berne , S. Trentesaux, A., Stolk, A., Missiaen, T. and DeBatsist, M., 1994. Architecture and long term evolution of a tidal sandbank: The Middelkerke Bank (southern North Sea): Marine Geology, 121, 52-72.

Brampton, A., Evans, C.D.R., and Velegrakis A.F., 1998. South Coast Mobility Study, CIRIA PR 65, London. 201 pp.

Britton, R. C., 1978. Structure of some marine sedimentary bodies and their dynamic environments. Ph.D. Thesis, Department of Oceanography, Swansea, University Of Wales. 255 pp.

Britton, R. C. and Britton, S. R., 1979. Sedimentary bedforms and linear banks. In: M. B. Collins, F. T. Banner, P. A. Tyler, S. J. Wakefield and A. E. James (editors), Industrial Embayments and Their Environmental Problems: A Case Study Of Swansea Bay, Pergamon Press: 177-191.

Caston, V.N.D, 1972. Linear sandbanks in the southern North Sea. Sedimentology, 18, 63-78.

Collins, M. B. Pattiaratchi, C.B., Banner, F.T., and Ferentinos, G.K., 1979. The supply of sand to Swansea Bay. In M. B. Collins, F. T. Banner, P. A. Tyler, S. J. Wakefield and A. James (editors) Industrialised Embayments And Their Environmental Problems: A Case Study Of Swansea Bay, Pergamon Press: 193-213.

Collins M.B., Shimwell, S., Gao, S., Powell, H., Hewitson, C., and Taylor, J.A., 1995. Water and sediment movement in the vicinity of linear sandbanks: The Norfolk Banks, Southern North Sea. Marine Geology, 123, 125-142.

Culver, S. J., 1979. Palaeolithic to iron age archaeology and palaeoenvironment in the Swansea area. In M. B. Collins, F. T. Banner, P. A. Tyler, S. J. Wakefield and A. James (editors) Industrialised Embayments And Their Environmental Problems: A Case Study Of Swansea Bay, Pergamon Press: 59-70.

Culver, S. J. and Bull, P.A., 1979. The Quaternary deposits of Swansea Bay. In M. B. Collins, F. T. Banner, P. A. Tyler, S. J. Wakefield and A. James (editors) Industrialised

Embayments And Their Environmental Problems: A Case Study Of Swansea Bay, Pergamon Press: 39-50.

De Moor, G., 1989. Maintenance on the Flemish Banks. In Henriet, J.P. and De Moor, G. (editors), The Quaternary and Tertiary Geology of the Southern Bight, North Sea, Ministry of Economic Affairs Belgian Geological Survey: 185-216.

DETR, 1999. Government View: New arrangements for the Licensing of Minerals Dredging (Interim Procedures). Mineral and Waste Planning Division, Department of Environment, Transport and the Regions. London. 15pp.

Duane, D.B., Field, M.E., Meisburger, E.P., Swift, D.J.P. and Williams, S.J., 1972. Linear shoals on the Atlantic inner continental shelf, Florida to Long Island. In D.J.P.Swift, D.B. Duane, O.H. Pilkey (editors), Shelf Sediment Transport: Process and Pattern, Doweden, Hutchinson and Ross, Stroudsbourg: 447-498.

Dyer, K. R. and Huntley, D. A., 1999. The origin, classification and modelling of sand banks and ridges. Continental Shelf Research, 19, 1285-1330.

Ebersole, B.A., Cialone, M.A. and Prater, M.D., 1986. RCPWAVE-A Linear Wave Propagation Model for Engineering Use. Regional Processes Numerical Modelling System, Report N° 1. Department of the US Army.

Faugeres, J-C. and Stow, D.A.V., 1993. Bottom-current-controlled sedimentation: a synthesis of the contourite problem. Sedimentary Geology, 82, 287-297.

FitzGerald, D.M., Penland, S. and Nummedal, D., 1984. Control of barrier island shape by inlet sediment bypassing: East Frisian Islands, West Germany. In B. Greenwood and R.A. Davis, Jr. (editors), Hydrodynamics and Sedimentation in Wave-Dominated Coastal Environments, Marine Geology, 60, 355-376.

Folk, R.L., 1980. Petrology of the Sedimentary Rocks. (2nd Edition). Hemphill Publishing Company, Austin, Texas, U.S.A.

Gao S., Collins, M.B., Lanckneus, J., De Moor, G. and Van Lancker, V., 1994. Grain size trends associated with net sediment transport patterns: an example from the Belgian Continental Shelf. Marine Geology, 121, 171-185.

Govaere, J. C. R., D., Van Damme, D. Heip, C., and De Coninck, L.A.P., 1980. Benthic communities in the Southern Bight of the North Sea and their use in ecological monitoring. Helgoländer Wissenschaftliche Meeresuntersuchungen, 33, 507-521.

Hammond, R.,1966. The Polychaeta of the coast of Norfolk. Cahiers de Biologie Marine, 7, 383-436.

Harris, P.T., 1988. Large scale bedforms as indicators of mutually evasive sand transport and the sequential infilling of wide mouth estuaries. Sedimentary Geology, 57, 272-298.

Harris, P. T. and Collins, M. B., 1984. Side-scan sonar investigation into temporal variation in sand wave morphology: Helwick Sands, Bristol Channel. Geo-Marine Letters, 4, 91-97.

Harris, P. T. and Collins, M. B., 1985. Bedform distributions and sediment transport paths in the Bristol Channel and Severn Estuary, U.K. Marine Geology, 62, 153-166.

Hayes, M.O. and Kana, T.W., 1976. Terrigenous Clastic Depositional Environments. University of South Carolina (Columbia) Technical Report N° 11. 364pp.

Houbolt, J. J. H. C., 1968. Recent sediments in the Southern Bight of the North Sea. Geologie en mijnbouw, 47, 245-273.

Houthouys, R., Trentesaux A. and De Wolf, P., 1994. Storm influences on a tidal sandbank's surface (Middelkerke Bank, southern North Sea): Marine Geology, 121, 23-41.

Huthnance, J.M., 1982a. One mechanism forming linear sandbanks. Estuarine, Coastal and Shelf Science, 14, 79-99.

Huthnance, J.M., 1982b. On the formation of sandbanks of finite extent. Estuarine, Coastal and Shelf Science, 15, 277-299.

Kenyon, N.H., Belderson, R.H., Stride A.H. and Johnson, M.A., 1981. Offshore tidal sandbanks as indicators of net sand transport and as potential deposits. International Association Sedimentologists, Special Publication, 5, 257-268.

Lanckneus, J., 1989. A comparative study of sedimentological parametres of some superficial sediments of the Flemish Banks. In Henriet, J.P. and De Moor, G. (editors), The Quaternary and Tertiary Geology of the Southern Bight, North Sea, Ministry of Economic Affairs Belgian Geological Survey: 229-241.

Lanckneus, J. and De Moor, G. 1991. Present day evolution of sand waves on a sandy shelf bank: Proceedings of the International Colloquium on the Environment of Epicontinetal Seas, Oceanologica Acta, Special Issue, 11, 123-127.

Marani, M., Roveri, A.A.M. and Trincardi, F., 1993. Sediment drifts and erosional Mediterranean: seismic evidence of bottom-current activity. Sedimentary Geology, 82, 207-220.

McIntyre, A. D. and D. J. Murison, 1973. The meiofauna of a flatfish nursery ground. Journal of the Marine Biological Association of the United Kingdom, 53, 93-118.

Pattiarachi, C.B., 1985. Hydrography and Sedimentology of a Headland Associated Linear Sandbank: Scarweather Sands, Northern Bristol Channel. Unpublished Ph.D. Thesis, University of Wales. 128pp.

Pattiarachi, C.B. and Collins, M.B., 1987. Mechanisms for linear sandbanks formation and maintenance, in relation to dynamical oceanographic observations. Progress in Oceanography, 19, 117-166.

Pingree, R.D., 1978. The formation of Shamples and other banks by the tidal stirring of the seas. Journal of the Marine Biological Association of the UK, 58, 211-226.

Pingree, R.D., and Maddock, L., 1979. The tidal physics of headland flows and offshore tidal bank formation. Marine Geology, 32, 269-289.

Posford Duvivier, 1999. Bristol Channel Marine Aggregates: Recources and Constraints. Posford Duvivier Draft Final Report, C1366 to the Welsh Office.

Ramussen, E., 1973. Systematics and ecology of the Isefjord marine fauna Denmark. Ophelia, 11, 1-495.

Smith, J.D., 1969. Geomorphology of a sand ridge. Journal of Geology, 17, 39-55.

Stoker, M.S., Akhurst M.C., Howe, J.A. and Stow, D.A.V., 1998. Sediment drifts and contourites on the continental margin off northwest Britain. Sedimentary Geology, 115, 33-51.

Stow, D.A.V., Faugeres, J.C., and Gonthier, E., 1986. Facies distribution and textural variation in Faro drift contourites: velocity fluctuation and drift growth. Marine Geology, 72, 71-100.

Suter, J.R., Mossa, J. and Penland, S., 1989. Preliminary assessment of the occurrence and effects of utilisation of sand and aggregate resources of the Luisiana inner shelf. Marine Geology, 90, 31-37.

Swift, D.J.P. and Field, M.E., 1981. Evolution of a classic sand ridge field: Maryland sector, North American inner shelf. Sedimentology, 28, 461-482.

Symonds, P.A., Eldholm, O., Mascle, J. and Moore, G.F., 2000. Characteristics of continental margins. In P.J. Cook and C.M. Carleton (editors), Continental Shelf Limits: the Scientific and Legal Interface, Oxford University Press: 25-63.

Tebble, N., 1966. British Bivalve Seashells: a Handbook for Identification. British Museum (Natural History), London.

Trentesaux, A., S. A., Stolk, A., Tessier, B., and Chamley, H., 1994. Surficial sedimentology of the Middelkerke Bank (southern North Sea). Marine Geology, 121, 43-55.

Tyler, P. A. and Shackley, S. E., 1979. The benthic ecology of linear sandbanks: A modified *Spisula* sub-community. In M. B. Collins, F. T. Banner, P. A. Tyler, S. J. Wakefield and A. James (editors) Industrialised Embayments And Their Environmental Problems: A Case Study of Swansea Bay, Pergamon Press: 539-554.

Van Lancker, V., 1999. Sediment and morphodynamics of a siliciclastic near coastal area, in relation to hydrodynamical and meteorological conditions: Belgian Continental Shelf. Unpublished Ph.D Thesis, Department of Geology and Soil Sciences, Universiteit Gent.194 pp.

Vanosmael, C., Willems, K. A., Claeys, D., Vincx, M., and Heip, C. 1982. Macrobenthos of a sublittoral sandbank in the Southern Bight of the North Sea. Journal of the Marine Biological Association of the United Kingdom, 62, 521-534.

Van Wesenbeeck, V. and Lanckneus, J., 2000. Residual sediment transport on a tidal sand bank: A comparison between the modified McLaren model and bedform analysis: Journal of Sedimentary Research, 70, 470-477.

Velegrakis, A.F., Voulgaris G., and Collins M.B., 1994. The role of waves and currents in the maintenance of a nearshore gravel bank. Proceedings of the 2nd International Conference on the Geology of Siliciclastic Shelf Seas, Ghent, 1994, 124-126.

Vincent, C.E., Stolk, A., and Porter, C.F.C., 1998. Sand suspension and transport on the Middelkerke Bank (southern Nort Sea) by storms and tidal currents: Marine Geology, 150, 113-129.

Warwick, R. M. and Davies, J. R., 1977. The distribution of sublittoral macrofauna communities in the Bristol Channel in relation to the substrate. Estuarine and Coastal Marine Science, 5, 267-288.

Wieser, W., 1953. Free-living marine nematodes. II. Chromadoroidea. Acta Universitatis Lundensis, 50(16), 148.

Willems, K. A., Vanosmael, C., Claeys, D., Vincx, M. and Heip, C., 1982a. Meiobenthos of a sublittoral sandbank in the Southern Bight of the North Sea. Journal of the Marine Biological Association of the United Kingdom 62, 535-548.

Willems, K. A., Vincx, M., Claeys, D., Vanosmael, C., and Heip, C., 1982b. Benthos of a sublittoral sandbank in the Southern Bight of the North Sea: General considerations. Journal of the Marine Biological Association of the United Kingdom 62, 549-557.

References to the German sites

Büsselberg, D. (1985): Kartierung des Makrobenthos im Elbe-Urstromtal der Deutschen Bucht. Diplomarbeit Univ. Hohenheim (in cooperation with Institut für Meeresforschung Bremerhaven), 59 S. and Annex.

Caspers, H. (1938): Die Bodenfauna der Helgoländer Tiefen Rinne. - Helgoländer wiss. Meeresuntersuchungen 2, 1-112.

Dörjes, J. (1977): Über die Bodenfauna des Borkum Riffgrundes (Nordsee). - Senckenbergiana marit. 9, 1-17.

Gillandt, L. (1979): Zur Ökologie der Polychaeten des Helgoländer Felslitorals. - Helgoländer wiss. Meeresunters. 32, 1-35.

Glémarec, M. (1973): The benthic communities of the European North Atlantic continental shelf. - Oceanogr. mar. Biol., Ann. Rev. 11, 263-289.

Harms, J. (1993): Check list of species (algae, invertebrates and vertebrates found in the vicinity of the island of Helgoland (North Sea, German Bight) - a review of recent records. - Helgoländer Meeresunters. 47: 1-34.

Heip, C., Basford, D., Craeymeersch, J.A., Dewarumez, J.-M., Dörjes, J., de Wilde, P., Duineveld, G., Eleftheriou, A., Herman, P., Niermann, U., Kingston, P., Künitzer, A., Rachor, E., Rumohr, H. Soetaert, K. & T. Soltwedel (1992): Trends in biomass, density and diversity of North Sea macrofauna. - ICES J. mar. Sci. 49, 13-22.

Janke, K. (1986): Die Makrofauna und ihre Verteilung im Nordost-Felswatt von Helgoland. - Helgoländer Meeresunters. 40, 1-55.

Kröncke, I. & E. Rachor (1992/93): Macrofauna investigations along a transect from the inner German Bight towards the Dogger Bank. - Mar. Ecol. Progr. Ser. 91, 269-276 (Bremerhaven-Workshop).

Kröncke, I. & R. Knust (1995): The Dogger Bank: A special ecological region in the central North Sea. - Helgoländer Meeresuntersuchungen 49, 335-353.

Kühne, S. & E. Rachor (1996): The macrofauna of a stony sand area in the German Bight. - Helgoländer Meeresunters. 50, 433-452.

Künitzer, A., Basford, D., Craeymeersch, J.A., Dewarumez, J.-M., Dörjes, J., Duineveld, G.C.A., Eleftheriou, A., Heip, C., Herman, P., Kingston, P., Niermann, U., A., Rachor, E., Rumohr & P.A.J. de Wilde (1992): The benthic infauna of the North Sea: species distribution and assemblages. - ICES J. mar. Sci. 49, 127-143.

Lindeboom, H.J. & S.J. de Groot (Hrsg., 1998): IMPACT-II. The effects of different types of fisheries on the North Sea and Irish Sea benthic ecosystems. - Nederlands Instituut voor Onderzoek der Zee (NIOZ) - Rapport 1998-1, 1-404 (EU-Projekt).

Nordheim, H. von & T. Merck (Hrsg., 1995): Rote Liste der Biotoptypen, Tier- und Pflanzenarten des deutschen Wattenmeer- und Nordseebereichs. - Schr.-Reihe Landschaftspflege Naturschutz, Heft 44, 1-139.

Rachor, E. (1990): Changes in sublittoral zoobenthos in the German Bight with regard to eutrophication. - Netherlands J. Sea Res. 25, 209-214.

Rachor, E. (1990): Veränderungen der Bodenfauna. In: LOZAN, J.L. et al. (Eds.): Warnsignale aus der Nordsee. - P. Parey Verlag, Berlin, Hamburg, S. 158- 165.

Rachor, E. et al. (1998): Rote Liste der bodenlebenden wirbellosen Meerestiere. Bundesamt für Naturschutz, Bonn (Hrsg.): Rote Liste gefährdeter Tiere Deutschlands. Schr.-Reihe Landschaftspflege Naturschutz, Heft 55: 290-300.

Salzwedel, H., Rachor, E. & D. Gerdes (1985): Benthic macrofauna communities in the German Bight. - Veröff. Institut Meeresforschung Bremerhaven 20, 199-267.

Sonntag, R.P., Benke, H., Hiby, A.R., Lick, R. & D. Adelung (1999): Identification of the first habour porpoise (*Phocaena phocaena*) calving ground in the North Sea. - J. Sea research 41, 225-232.

Ssymank, A., Hauke, U., Rückriem, Ch. & E. Schröder (1998): Das europäische Schutzgebietssystem NATURA 2000. Deutsches Handbuch zur Umsetzung der FFH- und der Vogelschutz-RL. - Schr.-Reihe Landschaftspflege Naturschutz, Heft 53, 1-556.

Tyedmers, S. (1998): Bestandsaufnahme des sublitoralen Makrozoobenthos im südlichen Bereich des Borkum-Riffgrundes im Vergleich zu früheren Untersuchungen. - Diplomarbeit Univ. Bremen ,107 S. mit Anhang - Publ. in prep.

3.4 Analysis of offshore submerged sandbanks inventory (WWF, overview maps and tables)

In this chapter, the maritime areas (200 nm zones) of European Union member states are mapped and the locations of sites indicated which are described by the definition of "submerged sandbanks" (Natura 2000 code 1110) in the Interpretation Manual of European Union Habitats (EUR 15/2). Tables list country by country the most important facts for each of the sites. For a full description of the sites please consult Volume V, holding the complete information as supplied by Velegrakis et al. (SOC) in their report to WWF. The identity numbers in the detailed maps (Fig. 3.2 to 3.5) correspond to the identity number in the tables in this volume (Tab. 3.2 to 3.10) and in the submerged sandbanks database (Vol. V).

3.4.1 North Sea

Fig. 3.2: Overview map of the maritime areas (200 nm zone) of the North Sea states depicting sites described by the definition of "submerged sandbanks" (Natura 2000 code 1110) in the Interpretation Manual of European Union Habitats (EUR 15/2).

Tab. 3.2: List of sites in the maritime area (200 nm zone) of Denmark in the North Sea described by the definition of "submerged sandbanks" (Natura 2000 code 1110) in the Interpretation Manual of European Union Habitats (EUR 15/2).

ID	Name	Lat. (°N)	Long.	Jurisd.	Site area (km^2)	Mid point water depth (m)	Sediments
77		57.10	7.34	DK	133	21.00	fine sand
78	Jutland Bank	56.85	7.36	DK	715	16.50	gravel, stones, sand
79		56.63	7.38	DK	62	25.00	sand, stones, mud

Tab. 3.3: List of sites in the maritime area (200 nm zone) of the Netherlands in the North Sea described by the definition of "submerged sandbanks" (Natura 2000 code 1110) in the Interpretation Manual of European Union Habitats (EUR 15/2).

ID	Name	Lat. (°N)	Long.	Jurisd.	Site area (km^2)	Mid point water depth (m)	Sediments
27	Rabs Bank	51.60	3.13	B+NL	80	8.50	sand
31	Schar	51.68	3.13	B+NL	19	12.80	gravel, brown sand
32		51.73	3.16	NL	5	15.90	coarse, brown sand
33	Steenbanken	51.65	3.33	NL	48	5.80	sand
34	Middelbank	51.70	3.33	NL	50	11.80	coarse sand, shells
35	Schowen Bank	51.78	3.35	NL	60	11.00	coarse, brown sand
66	Brown Ridge	52.63	3.32	NL?	14	17.40	fine sand, broken shells

Tab. 3.4: List of sites in the maritime area (200 nm zone) of Belgium in the North Sea described by the definition of "submerged sandbanks" (Natura 2000 code 1110) in the Interpretation Manual of European Union Habitats (EUR 15/2).

ID	Name	Lat. (°N)	Long.	Jurisd.	Site area (km^2)	Mid point water depth (m)	Sediments
8	Kwinte Bank	51.29	2.66	B	47	5.10	coarse sand, shells
9	Middelkerke Bank	51.32	2.75	B	18	5.80	coarse sand, broken shells
18	N.N.	51.50	2.48	B	19	11.90	sand, shells
19	West Hinder	51.47	2.50	B	55	5.50	sand
20	N.N.	51.42	2.55	B	10	11.00	coarse sand, shells
21	North Hinder	51.63	2.58	B	13	8.50	sand, shells
22	East Hinder	51.58	2.68	B	37	11.90	coarse sand, shells
23	Bligh Bank	51.62	2.78	B	20	11.00	sand, shells
24		51.41	2.73	B	19	12.20	coarse sand, shells
25	Goote Bank	51.45	2.85	B	29	20.00	sand
26	Thornton Bank	51.58	3.00	B	125	5.50	sand, shells
28		51.62	2.92	B	22	15.90	fine sand, shells
29		51.70	3.00	B	9	14.00	fine sand, shells
27	Rabs Bank	51.60	3.13	B+NL	80	8.50	sand
31	Schar	51.68	3.13	B+NL	19	12.80	gravel, brown sand

Tab. 3.5: List of sites in the maritime area (200 nm zone) of Germany in the North Sea described by the definition of "submerged sandbanks" (Natura 2000 code 1110) in the Interpretation Manual of European Union Habitats (EUR 15/2).

ID	Site name*	Position	Jurisd.	Site area (km^2)	Extent of habitat
A	Borkum Reef	53° 50´N, 6° 30´ E in	GER	920km^2 in	Approx. 80 % of the surface of

		the western German Bight		total of which approx. 75000 ha sandbank	Borkum Reef can be characterized as a sandbank. Its western edge partially has reef character.
B	Amrum Outer Ground	54° 45´N, 7° 45´ E in the eastern German Bight	GER	1400 km^2	100 %
C	Heligoland area	54° 13´N, 7° 57´ E in the central German Bight	GER	approx. 85o km^2	The area proposed as SAC covers approx. 1/5 of all sandbank habitats and 100 % of the rocky habitats in the German Bight.
D	Dogger Bank (tail end)	55°35´ N, 4° 00´ E , central North Sea	GER	1400 km^2	?
E	Ancient Elbe river bed	54° 40´N, 7° 00´E	GER	>350 km^2	?

* These sites constitute scientific proposals (by Dr. E. Rachor, Alfred Wegener Institute, Germany) of possible offshore SACs in the German Bight. The "Federal Agency for Nature Conservation" (BfN) proposed them to the German Federal Ministry of Environment and Nature conservation in spring 2000. They are still under debate. The map of areas under discussion in May 2001 can be found at http://www.bfn.de/09/nordsee.pdf (explanations in german).

3.4.2 UK and Ireland

Fig. 3.3: Overview map of the maritime areas (200 nm zone) of the United Kingdom and Ireland depicting sites described by the definition of "submerged sandbanks" (Natura 2000 code 1110) in the Interpretation Manual of European Union Habitats (EUR 15/2).

Tab. 3.6: List of sites in the maritime area (200 nm zone) of the United Kingdom described by the definition of "submerged sandbanks" (Natura 2000 code 1110) in the Interpretation Manual of European Union Habitats (EUR 15/2.

ID	Name	Lat. (°N)	Long.	Jurisd.	Site area (km^2)	Mid point water depth (m)	Sediments
1	The Varne	51.97	1.35	UK	16	3.70	sand
2	South Falls	51.36	1.79	UK	24	8.20	coarse sand, shingel, shells
4	Goodwin Sands	51.25	1.52	UK	166	0.91	sand
5	Ridens de Calais	51.16	1.82	UK?	8	10.00	sand
14	North Falls	51.66	1.94	UK	11	9.40	sand, fine sand, broken shells
15	Galloper	51.79	1.97	UK	11	2.80	sand, gravel, shells
30		52.50	1.98	UK	7	10.60	fine sand, shells
36	Inner Gabbard	51.92	1.90	UK	23	6.10	sand, mud, gravel, broken shells
37	Outer Gabbard	51.95	2.03	UK	8	8.80	sand
38		52.03	1.68	UK	15	15.10	sand
39		52.02	1.64	UK	64	11.20	fine sand
40		52.63	1.87	UK	41	4.60	sand
41	NE Cross Sands	52.70	1.97	UK	6	14.00	sand
42		52.73	1.98	UK	2	16.80	sand
43	Newarp Banks	52.75	1.92	UK	5	7.60	sand
44	Newarp Bank (W)	52.70	1.88	UK	8	11.50	sand
45	Winterton Shoal	52.74	1.78	UK	16	10.70	sand
46	Hearty Knoll	52.77	2.13	UK	17	9.70	sand
47	Winterton Ridge	52.84	2.00	UK	21	6.40	fine sand, shells
48		52.89	2.03	UK	8	16.50	sand, shells
49	Smith's Knoll	52.87	2.22	UK	42	10.00	sand
50	Hammond Knoll	52.87	1.94	UK	24	4.90	sand, gravel
51	North Hammond Knoll	52.90	1.94	UK	2	13.40	sand, gravel
52	Haisborough Sand	52.93	1.71	UK	58	9.70	sand, shells
53	Haisborough Tail	52.89	1.84	UK	62	6.10	sand, stones
54	Hewett Ridge	52.97	2.00	UK	51	12.80	sand, stones
55	Leman Bank	53.12	1.94	UK	104	4.20	sand
56	Ower Bank	53.22	1.92	UK	101	12.80	sand, small stones, shells
57	Inner Bank	53.22	2.00	UK	30	11.00	samd
58	Well Bank	53.22	2.11	UK	195	8.20	sand, stones
59	Broken bank	53.30	2.18	UK	59	14.70	sand, shells
60	Swarte Bank	53.38	2.24	UK	43	11.00	sand, mud

ID	Name	Lat. (°N)	Long.	Jurisd.	Site area (km^2)	Mid point water depth (m)	Sediments
61	Viking Field	53.45	2.33	UK	92	16.50	sand
62	Haddock Bank	53.29	1.58	UK	160	8.50	sand, fine sand, gravel
63		53.48	1.46	UK	62	9.30	sand, stones
64	Inner Cromer Knoll	53.22	1.46	UK	18	11.60	fine sand
65	Cromer Knoll	53.31	1.28	UK	38	6.40	sand, stones, shingle
67	Dogger Bank	54.82	2.67	UK+NL+D	20000	18.30	sand, fine sand, shells, clay, mud
68	Outer Well Bank	54.12	2.00	UK	187	20.70	fine sand, shells, gravel
69	The Hills	54.32	1.05	UK	650	270.00	sand
70	Outer Dowsing Shoal	53.46	1.10	UK	83	4.50	sand, shells, stones
71	Indefatigable Bank	53.55	2.33	UK	143	16.30	coarse sand, shells, gravel
72		55.75	-1.39	UK	2	4.60	gravel
73		55.99	-1.81	UK	4	49.00	sand
80	Berwick Bank	56.18	-1.38	UK	19	44.00	sand
81	Wee Bankie	56.33	-1.90	UK	219	34.00	fine sand, shells
82		56.24	-2.26	UK	53	44.00	fine sand, broken shells, gravel
83		56.60	-2.29	UK	6	32.00	sand
84		56.76	-2.12	UK	2	48.00	sand
85		56.71	-1.98	UK	10	44.00	sand
86	Scalp Bank	56.55	-1.99	UK	249	34.00	sand, gravel, shells
87	Marr Bank	56.41	-1.68	UK	566	44.00	sand, shells
88		56.62	-2.08	UK	3	43.00	sand
89	Smith Bank	58.10	-3.00	UK	1170	36.00	sand, shells
90		57.92	-2.43	UK	30	38.00	mud
91	West Bank	58.13	-2.07	UK	228	51.00	fine sand
92	South or Bosies Bank	58.05	-1.49	UK	518	64.00	sand, ooze
93		57.76	-2.22	UK	40	42.00	rock, sand, gravel
94	Turbot Bank	57.42	-0.97	UK	0	57.00	sand, shells
95		57.88	-0.88	UK	363	90.00	fine sand
96		58.16	-0.62	UK	54	89.00	sand
97	Halibut Bank	57.73	-0.19	UK	377	85.00	sand
98	Little Halibut Bank	58.30	-1.24	UK	389	67.00	sand
99		58.30	-1.80	UK	830	88.00	sand
100		58.52	-1.66	UK	56	77.00	sand
101		58.53	-1.30	UK	91	69.00	sand
102		58.41	-1.04	UK	27	93.00	sand
103	Dutch Bank	59.33	-0.80	UK	0	126.00	sand, ooze
104	Fairisle Bank	59.37	-1.55	UK	0	80.00	sand, shells
105	Papa Bank	59.70	-3.38	UK	0	57.00	sand, shells
106	Foula Bank	59.99	-2.22	UK	0	78.00	sand, shells
107	Bressay Bank	59.39	0.10	UK	33	82.00	fine sand
108	Forty Mile Bank	59.93	0.30	UK	58	82.00	sand
109	Pobie Bank	60.72	-0.12	UK	286	86.00	gravel
110		60.05	-0.58	UK	52	67.00	coarse sand, voral
111		59.99	1.42	UK	31	91.00	sand
112		60.08	1.50	UK	1480	92.00	sand, ooze
114		59.24	-6.18	UK	29	91.50	fine sand, shells

ID	Name	Lat. (°N)	Long.	Jurisd.	Site area (km^2)	Mid point water depth (m)	Sediments
115	Sulisker Bank	59.02	-6.27	UK	143	46.00	rock, fine sand, shells
116		58.82	-6.13	UK	2	60.00	fine sand
117	Solan Bank	59.07	-4.88	UK	18	51.00	fine sand, rock, shells, stones
118	Nun Bank	58.92	-4.92	UK	99	46.00	rock, shells, sand, gravel
119	White Head Bank	58.82	-4.35	UK	196	48.00	sand, shells, rock, stones
135		59.58	-8.35	UK	163	827.00	sand, mud
136		59.91	-7.63	UK	65	470.00	sand
138		60.67	-9.38	UK	30	154.00	sand
141	Rosemary bank	59.25	-10.20	UK	28300	311.00	gravel, sand
142		59.88	-10.55	UK	75	771.00	mud, clay, sand
143		59.88	-10.81	UK	20	771.00	mud, sand, clay
146	George Bligh Bank	58.94	-13.83	UK	388	428.00	sand, clay, mud
147	Anton Dohrn Sea-mount	57.45	-11.13	UK	1786	530.00	sand, rock
148	Rockall Bank	57.34	-13.90	UK+Ire ?	10692	130.00	sand, fine sand, gravel
149	Empress of Britain Bank	56.32	-15.00	UK+Ire ?	101	143.00	fine sand
152	Stanton Banks	56.20	-7.83	UK	330	38.00	sand, shells, calcareous weed, rock
153		56.21	-7.65	UK	2	94.00	fine sand, shells
154		56.36	-6.68	UK	16	12.00	sand, shells, gravel, mud
155		56.35	-7.36	UK	100	12.70	mud, sand, shells
156		56.33	-6.65	UK	22	19.90	sand, gravel, stones
157		56.25	-6.67	UK	11	34.00	sand
158	Scarinish Bank	56.49	-6.74	UK	14	23.00	sand, shells, gravel, pebbles
159		56.18	-6.35	UK	10	14.90	sand, shells, rock
160	Dubh Artach	56.09	-6.75	UK	52	43.00	mud, fine sand
161		56.19	-6.64	UK	2	27.00	sand
166		55.87	-6.77	UK	3	43.00	fine sand
167	Hempton's Turbot Bank	55.44	-6.95	UK	3	15.80	coarse sand, shells, gravel
168	West Bank	55.73	-6.59	UK	2	11.90	gravel, sand
169		55.64	-6.84	UK	2	40.00	sand, shells
170		55.55	-6.80	UK	1	29.00	sand
171		55.44	-6.72	UK	5	35.00	fine sand, shells
172	Middle Bank	55.47	-6.46	UK	13	25.00	sand, shells
173	Laconia Bank	55.37	-6.36	UK	16	20.10	sand, shells
178		55.00	-5.73	UK	9	29.00	sand, shells, gravel
179		55.09	-5.37	UK	7	33.00	fine sand, shells
180	Rigg Bank	54.65	-5.48	UK	3	11.00	sand
181		54.52	-5.16	UK	3	63.00	fine sand, mud
182		54.50	-5.06	UK	2	75.00	fine sand, mud
183		54.53	-4.97	UK	2	43.00	sand, mud
184		54.50	-5.17	UK	6	67.00	fine sand, shells
185		54.45	-5.12	UK	27	54.00	fine sand, broken shells
186		54.49	-4.88	UK	4	38.00	sand, broken shells

ID	Name	Lat. (°N)	Long.	Jurisd.	Site area (km^2)	Mid point water depth (m)	Sediments
187		54.39	-5.25	UK	3	67.00	mud
188		54.38	-5.15	UK	21	83.00	sand
189		54.41	-5.12	UK	2	81.00	sand
190		54.46	-5.06	UK	11	59.00	sand, fine sand
191	Ardglass Bank	54.22	-5.57	UK	6	14.60	fine sand
192		54.12	-5.03	UK	4	14.80	coarse sand, broken shells
202		54.52	-4.45	UK	9	23.00	sand, shells
203		54.66	-4.26	UK	2	25.00	sand
204	Three Fathoms Bank	54.68	-3.67	UK	12	2.80	sand, broken shells
205	Workington Bank	54.65	-3.64	UK	13	5.40	sand
206	King William Banks	54.44	-4.11	UK	33	3.40	sand, shells
207	Ballacash Bank	54.44	-4.21	UK	13	2.30	sand
208	Bahama Bank	54.38	-4.25	UK	10	1.30	sand, shingle, shells
209	Wart Bank	54.03	-4.77	UK	2	12.30	sand
210		53.85	-4.63	UK	3	45.00	sand, fine sand, shells
211		53.87	-4.52	UK	4	42.00	fine sand
212		53.84	-4.60	UK	2	50.00	sand, stones, shells
213		53.81	-4.65	UK	9	45.00	sand, stones, shells
214		53.79	-4.87	UK	4	45.00	coarse sand, broken shells
215		53.77	-4.85	UK	4	42.00	coarse sand, broken shells
216		53.75	-4.84	UK	3	43.00	sand, shells
217		53.67	-4.40	UK	4	44.00	stones, broken shells, sand
218		53.52	-4.71	UK	6	46.00	gravel, broken shells, coarse sand
219		53.50	-4.76	UK	44	38.00	coarse sand, broken shells
220	Constable Bank	53.38	-3.75	UK	21	5.00	sand, gravel
221		53.19	-5.03	UK	1	49.00	mud, sand, stones, broken shells
222		53.24	-4.63	UK	0	11.70	sand
223		53.17	-4.54	UK	0	16.00	sand
224		53.16	-4.54	UK	1	12.00	sand
225		53.15	-4.51	UK	4	17.20	sand, shells
226		53.14	-4.48	UK	0	7.20	sand, shells
227	The Tripods	52.83	-4.77	UK	2	10.10	sand
228	Devil's Ridge	52.75	-4.67	UK	10	10.80	sand, stones, shells
229	Bastram Shoal	52.71	-4.78	UK	7	6.30	sand, shells, coral
230	The Devil's Tail	52.67	-4.68	UK	21	23.00	sand, gravel
231		52.61	-4.75	UK	2	25.00	sand, stones, shells
232	St Gowan Shoals	51.54	-4.96	UK	5	6.40	sand, shells
233	Helwick Sands	51.53	-4.30	UK	14	1.30	sand, shells
234		51.51	-4.32	UK	18	28.00	sand, shells
235		51.44	-4.48	UK	1	25.00	sand

ID	Name	Lat. (°N)	Long.	Jurisd.	Site area (km^2)	Mid point water depth (m)	Sediments
236		51.42	-4.42	UK	1	30.00	sand
237		51.40	-4.47	UK	1	23.00	sand
238		51.40	-4.39	UK	1	21.00	sand
239		51.46	-4.42	UK	11	24.00	sand
240		51.45	-4.28	UK	20	26.00	sand, stones
241	White Oyster Ledge	51.51	-3.99	UK	13	8.50	pebbles, sand, mud, shells
242		51.30	-4.50	UK	35	13.90	pebbles, coarse sand, gravel
243		51.35	-4.79	UK	3	44.00	coarse sand
244	Stanley Bank	51.22	-4.60	UK	5	8.20	sand, shells
245	North West Bank	51.18	-4.72	UK	6	12.80	sand
246	East Bank	51.17	-4.63	UK	4	14.30	sand, shells
247	Bais Bank	51.95	-5.36	UK	22	10.00	gravel, sand, shells
248		51.78	-5.58	UK	14	43.00	sand, gravel
249		51.59	-5.38	UK	4	41.00	sand, shells, mud
250		50.89	-4.68	UK	9	29.00	sand
251	Cape Cornwall Bank	50.20	-5.83	UK	7	27.00	sand, stones, shells
252		50.21	-5.92	UK	14	29.00	sand, shells
261		59.49	-8.80	UK	27	86.00	fine sand
265	North West Bank	50.18	-7.68	UK	931	77.00	coarse sand, broken shells
266	Jone's Bank	49.82	-8.00	UK	257	73.00	fine sand
267		49.84	-8.48	UK	45	88.00	fine sand
268		49.74	-8.83	UK	125	73.00	sand
269		49.65	-6.91	UK	3	89.00	sand, stones
270		50.02	-5.95	UK	33	37.00	sand, pebbles, broken shells
271		49.92	-5.27	UK	2	32.00	sand, shells, small gravel
272		49.91	-5.25	UK	1	47.00	sand, shells, gravel
273		49.45	-5.46	UK	4	96.00	sand, gravel, shells
274		50.18	-3.91	UK	1	23.00	sand, stones
275		50.16	-3.89	UK	1	25.50	sand, stones
276	Skerries Bank	50.25	-3.60	UK	12	3.30	sand
277		50.25	-3.51	UK	1	36.00	sand, shells
278		50.25	-3.52	UK	1	48.00	sand, shells
279		50.24	-3.00	UK	10	45.00	gravel, sand, shells
280		50.27	-2.97	UK	6	42.00	gravel, sand, shells
281		50.30	-2.97	UK	2	43.00	gravel, sand, shells
282		50.33	-2.93	UK	69	32.00	gravel, sand, shells
283		50.27	-2.87	UK	88	38.00	sand, gravel, shells
284		50.22	-2.87	UK	17	45.00	sand, gravel, shells
285		50.17	-2.93	UK	25	42.00	sand, gravel, shells
286	Dolphin Bank	50.67	-1.64	UK	1	5.80	fine sand
287	Ryde Middle	50.77	-1.23	UK	4	3.40	mud, sand,

ID	Name	Lat. (°N)	Long.	Jurisd.	Site area (km^2)	Mid point water depth (m)	Sediments
	Ground						gravel
288		50.57	-1.25	UK	1	15.40	fine sand, broken shells
289		50.76	-1.16	UK	1	16.60	mud, sand, shingle
290	Medmerry Bank	50.71	-0.84	UK	2	3.70	fine sand
291		50.56	-1.16	UK	25	15.00	broken shells, stones, gravel
292		50.64	0.00	UK	1	27.50	fine sand, broken shells
293		50.58	0.26	UK	1	49.00	fine sand, broken shells, spebbles, weed
294		50.58	0.29	UK	4	46.00	sand, broken shells, small gravel, pebbles
295		50.68	0.39	UK	1	18.20	sand, broken shells gravel, pebbles
296		50.68	0.43	UK	4	14.80	broken shells, small gravel, pebbles
297	Long Sand	50.75	0.41	UK	2	5.60	sand
298		50.77	0.42	UK	3	7.60	sand, broken shells
299	Four Fathoms Sand Ridge	50.81	0.63	UK	10	5.70	fine sand, broken shells
300		50.85	0.86	UK	1	17.80	sand
301		50.86	1.12	UK	1	28.50	sand, broken shells, stones
302		50.86	1.16	UK	2	28.50	sand, shells, stones
303	Bullock Bank	50.75	1.07	UK	12	14.70	sand, broken shells, small gravel, pebbles
313	The Ridge or Le Colbart	50.88	1.33	UK?	28	1.60	sand, fine sand

Tab. 3.7: List of sites in the maritime area (200 nm zone) of Ireland described by the definition of "submerged sandbanks" (Natura 2000 code 1110) in the Interpretation Manual of European Union Habitats (EUR 15/2.

ID	Name	Lat. (°N)	Long.	Jurisd.	Site area (km^2)	Mid point water depth (m)	Sediments
148	Rockall Bank	57.34	-13.90	UK+Ire ?	10692	130.00	sand, fine sand, gravel
149	Empress of Britain Bank	56.32	-15.00	UK+Ire ?	101	143.00	fine sand
151		54.63	-10.01	Ireland	19	95.00	fine sand, shells
162		55.07	-9.04	Ireland	2	43.00	sand
163		55.10	-8.55	Ireland	106	44.00	sand
164		52.42	-7.71	Ireland	5	46.00	sand, gravel
165		55.76	-7.16	Ireland	27	39.00	coarse sand, gravel
174		54.33	-12.68	Ireland	24	1536.00	sand

ID	Name	Lat. (°N)	Long.	Jurisd.	Site area (km^2)	Mid point water depth (m)	Sediments
175	Porcupine Bank	53.28	-13.74	Ireland	5220	152.00	coarse and fine sand
176		52.38	-12.52	Ireland	25	478.00	sand, mud
177		53.60	-10.72	Ireland	31	97.00	sand
193		53.40	-5.66	Ireland	23	29.00	fine sand
194	Bennet Bank	53.38	-5.98	Ireland	0	13.50	sand
195	Burford Bank	53.30	-6.02	Ireland	160	4.60	sand
196	Kish bank	53.24	-5.92	Ireland	4.6	1.60	sand
197	Bray Bank	53.17	-5.90	Ireland	17	4.70	sand
198	Codling Bank	53.13	-5.87	Ireland	21	2.60	sand
199	India Bank	53.03	-5.89	Ireland	2	7.80	gravel
200	Arklow Bank	52.81	-5.95	Ireland	34	0.90	gravel, sand, stones
201		52.87	-5.99	Ireland	2	16.50	sand
253		50.82	-8.90	Ireland	23	93.00	sand
254		50.87	-8.27	Ireland	112	73.00	sand
255		50.80	-7.75	Ireland	215	71.00	sand
256		50.75	-8.20	Ireland	14	91.00	sand
257		50.70	-8.90	Ireland	83	88.00	fine sand
258		50.57	-9.38	Ireland	98	97.00	sand, stones, shells
259		50.40	-9.65	Ireland	23	95.00	sand, stones, shells
260		50.30	-9.23	Ireland	21	93.00	fine sand
262		50.54	-8.54	Ireland	64	88.00	sand
263	Labadie Bank	50.55	-8.17	Ireland	555	75.00	sand, fine sand
264	West Bank	50.22	-8.65	Ireland	616	95.00	sand

3.4.3 France and Spain

Fig. 3.4: Overview map of the maritime areas (200 nm zone) France and Spain in the Atlantic depicting sites described by the definition of "submerged sandbanks" (Natura 2000 code 1110) in the Interpretation Manual of European Union Habitats (EUR 15/2).

Tab. 3.8: List of sites in the maritime area (200 nm zone) of France in the Atlantic described by the definition of "submerged sandbanks" (Natura 2000 code 1110) in the Interpretation Manual of European Union Habitats (EUR 15/2.

ID	Name	Lat. (°N)	Long.	Jurisd.	Site area (km^2)	Mid point water depth (m)	Sediments
3	Sandettie	51.24	1.95	F	58	5.50	coarse sand, broken shells
6	West Dyck	51.09	2.08	F	39	6.40	sand
7	Oost Dyck	51.26	2.43	F+B	69	7.60	sand
10	Inner Ruytingen.	51.21	2.28	F	9	4.80	sand
11	Outer Ruytingen	51.15	2.10	F	98	6.40	sand
12	Bergues Bank	51.28	2.35	F+B	36	13.00	sand
13	Radial Bank	51.55	2.23	F	2	15.60	sand, shells
16	N.N.	51.48	2.28	F+B	6	13.70	fine sand, shells, gravel
17	Fairy Bank	51.47	2.39	F+B	96	10.00	fine, speckled sand, shells, gravels
304	Bassurelle	50.60	1.08	F?	48	6.80	sand, broken shells
305		50.56	1.05	F?	8	25.00	fine sand
306		50.55	1.08	F?	2	25.00	fine sand
307		50.55	1.12	F?	1	27.00	fine sand
308		50.66	1.29	F?	33	26.00	gravel
309	Vergoyer	50.52	1.20	F	122	11.00	fine sand, gravel
310	Bassure de Baas	50.50	1.41	F	170	5.50	fine sand, gravel
311		50.37	1.03	F	5	17.00	gravel
312	Battur	50.40	1.37	F	72	8.90	sand, broken shells
314	Les Ridens	50.75	1.29	F	37	15.00	sand, shells
315		49.55	0.02	F	2	2.30	sand, broken shells
316		49.59	-0.16	F	2	17.00	sand, gravel, shells
317	Banc de Seine	49.47	-0.25	F	0	12.20	sand
318	Bank du Cardonnet	49.46	-1.08	F	16	5.10	sand
319	Banc de St Marcouf	49.51	-1.16	F	2	2.90	sand
320	Banc de la Rade	49.54	-1.22	F	4	4.70	sand
326		49.62	-2.26	F?	2	29.30	sand, stones
329	Rigdon Bank	49.25	-2.29	F	2	3.40	sand
330	Banc de la Corbiere	49.90	-1.91	F	18	8.80	sand
331	Bancs de Sable	48.82	-2.82	F	17	5.50	sand, gravel, shells

ID	Name	Lat. (°N)	Long.	Jurisd.	Site area (km^2)	Mid point water depth (m)	Sediments
332	Banc Maurice	48.96	-2.93	F	2	12.80	gravel
333		49.07	-2.97	F	5	44.00	gravel, shells
334		49.11	-3.00	F	7	5.30	sand, shells
335		49.51	-3.07	F	15	55.00	rock, covered with gravel
336	Banc des Langoustieres	49.28	-3.33	F	6	35.00	coarse sand, shells
337		48.97	-4.75	F	20	88.00	fine sand
338	Banc du Four	48.53	-4.89	F	6	36.60	sand
339	Haut Fond d' Ouessant	48.38	-5.16	F	2	44.00	gravel, shells
340		48.02	-5.25	F	2	36.00	sand, broken shells
341	Parson's Bank	48.43	-6.57	F	0	117.00	sand, shells
342	Kaiser I Hind Bank	48.12	-6.58	F	0	117.00	sand, broken shells
343	Banc de Quiberon	47.49	-3.04	F	2	6.90	mud, sand
344	Banc de Kerouars	47.10	-2.24	F	6	2.30	sand
345		45.99	-1.50	F	2	13.20	sand
371		45.54	-2.77	F	10	75.00	gravel, broken shells
372		45.50	-3.28	F	11	97.00	gravel, broken shells

Tab. 3.9: List of sites in the maritime area (200 nm zone) of Spain in the Atlantic described by the definition of "submerged sandbanks" (Natura 2000 code 1110) in the Interpretation Manual of European Union Habitats (EUR 15/2.

ID	Name	Lat. (°N)	Long.	Jurisd.	Site area (km^2)	Mid point water depth (m)	Sediments
346	Bajo Castro Verde	43.54	-3.22	E	2	53.00	stones
347		43.44	-3.29	E	2	46.00	gravel
348	Bajo el Doble	43.50	-3.45	E	1	13.00	stones
349		43.54	-3.47	E	1	47.00	stones
350	Bajo el Castro	43.51	-3.64	E	2	100.00	sand
351	Bajo Maruca	43.65	-3.66	E	18	42.00	stones
352	Cabezo de Tierra	43.52	-3.85	E	1	17.00	stones
353	Bajo del Castro	43.52	-3.91	E	1	39.00	stones
354	Bajo Juan de Ambojo	43.52	-3.96	E	1	34.00	stones
355	Bajo Cadramon	43.50	-4.01	E	1	50.00	stones
356		43.69	-4.03	E	16	835.00	mud
357	Cabezo Coraje	43.52	-4.00	E	49	66.00	stones
358	Bajo Torriente	43.46	-4.23	E	1	22.00	stones
359	Bajo Luana	43.44	-4.26	E	1	26.00	stones
360		43.97	-4.46	E	130	340.00	mud, sand
361		43.58	-5.66	E	1	14.20	stones
362		43.64	-5.99	E	1	43.00	stones
363		44.07	-5.96	E	13	353.00	sand, gravel
364		43.87	-6.18	E	7	150.00	stones, sand, algae
365	El Serron	43.63	-6.56	E	3	39.00	stones
366		43.67	-6.86	E	4	97.00	stones
367		44.09	-7.05	E	43	115.00	sand
368		43.78	-8.03	E	1	48.00	stones

ID	Name	Lat. (°N)	Long.	Jurisd.	Site area (km^2)	Mid point water depth (m)	Sediments
369		44.08	-7.94	E	4	183.00	sand
370	Bako Niebla	43.82	-8.10	E	3	59.00	gravel
373	Galicia Bank	42.67	-11.74	E	2200	759.00	sand, mud
375	Cabezo de Lage	43.25	-9.08	P	1	48.00	sand
376	Las Baleas	43.20	-9.21	P	1	12.20	stones
377	Las Quibrantes	43.14	-9.24	P	2	0.10	stones
378	Leixon de Juanboy	43.12	-9.26	P	1	8.80	sand, stones
379		42.82	-9.19	P	2	4.80	sand
380	Bajo de los Meixidos	42.76	-9.20	P	11	2.80	sand
381	La Baya	42.70	-9.67	P	5	1.80	stones
382		42.66	-9.07	P	1	11.00	gravel
383	Bco. las Basonas	42.63	-9.09	P	5	6.50	gravel
384	Las Pozas	42.56	-9.20	P	4	29.00	stones
385	Ba. De Corrubedo	42.54	-9.11	P	4	1.70	sand, stones
386	Bco. Del Praquiero	42.51	-9.08	P	4	9.00	sand
392	Banco del Hoyo	36.09	-6.27	E/P	25	20.00	sand
393		36.13	-6.22	E	4	14.00	sand, gravel
394		36.11	-6.16	E	4	14.90	sand
395	Banco de Trafalgar	36.14	-6.12	E	12	12.50	sand
396	Placer de Meca	36.19	-6.11	E	11	6.10	sand
397		36.15	-6.26	E	1	17.00	sand
398	The Ridge	35.92	-5.92	E	93	62.00	gravel
399	Banco del Oeste	36.02	-5.75	E	1	17.00	sand, stones
400	Los Cabezos	36.02	-5.71	E	5	4.80	stones
401	Placer Nuevo	36.01	-5.72	E	2	12.00	stones

3.4.4 Portugal

In the maritime area (200 nm zone) of the Azores, there are no sites described by the definition of "submerged sandbanks" (Natura 2000 code 1170) in the Interpretation Manual of European Union Habitats (EUR 15/2) . Sites in the EEZ of mainland Portugal are mapped in Fig. 3.5.

Fig. 3.5: Overview map of the maritime area (200 nm zone) of Portugal depicting sites described by the definition of "submerged sandbanks" (Natura 2000 code 1110) in the Interpretation Manual of European Union Habitats (EUR 15/2).

Tab. 3.10: List of sites in the maritime area (200 nm zone) of Portugal described by the definition of "submerged sandbanks" (Natura 2000 code 1110) in the Interpretation Manual of European Union Habitats (EUR 15/2.

ID	Name	Lat. (°N)	Long.	Jurisd.	Site area (km^2)	Mid point water depth (m)	Sediments
374	Gettysberg or Gorringe Bank	36.67	-11.75	P	1916	23.00	sand, mud
387		39.26	-9.60	P	2	42.00	fine sand, sand, broken shells
388		38.80	-9.77	P	10	43.00	fine sand
389		38.77	-9.75	P	14	43.00	fine sand
390		37.21	-8.95	P	2	42.00	sand
391		37.17	-9.00	P	5	43.00	sand

3.4.5 Conclusions

This is a first attempt to list, on a regional scale, habitat sites which potentially qualify as an offshore SAC under the EU Habitats Directive. Further to the conclusions drawn by the authors of the report on "Submerged sandbanks in European Waters" it is obvious that more biological information is required in order to assess a systematic relationship between physical setting and biological characteristics of the different types of banks. If such a systematic link could be established, this would help substantially to design an ecologically representative network of submerged sandbanks, to be safeguarded under the EU Habitats Directive.

Most of the submerged sandbanks described for the Northeast Atlantic (391 submerged sandbanks in the 200 nm zones of EU member states) are located in the Southern Bight, the Channel and the Irish Sea. Due to the vast size of the UK maritime area, 57 % (207) of the submerged sandbanks come under UK jurisdiction, some of the sites together with other nations. For example, the Dogger Bank falls under the jurisdiction of the UK, the Netherlands and Germany which raises the need for a transboundary SAC in order to safeguard the ecological integrity of the sandbank Dogger Bank as a whole.

4 OVERALL CONCLUSION (WWF)

In the Northeast Atlantic, most of the 90 “reef” sites within the 200 nm limit of EU Member States are found in Ireland (62 %) and Portugal/the Azores (18 %), while 58 % of the 361 “submerged sandbanks” are concentrated around UK. The Channel, the Southern Bight and the Irish Sea in particular have many “submerged sandbanks".

Tab. 4.1: Relative distribution of "reefs" described in the reefs database (Vol. IV) and “submerged sandbanks” in the European Submerged Sandbanks Database (ESSB, Vol. V) in the Northeast Atlantic, in the waters of the European Union and in EU member states (WWF). *This table is designed as a rough guide only, the percentage of sites for each country is likely to alter following the introduction of further information.*

	Reefs			Sandbanks		
Region/State	**No.**	**%**	**%**	**No.**	**%**	**%**
Northeast Atlantic	**133**	**100.0**		**391**	**100.0**	
Within EU 200nm limit	90	67.7	**100.0**	361	92.2	**100.0**
non-EU 200nm limit	24	18.0		30	7.8	
High Seas	14	10.5		0	0.0	
no jurisd. found	5				0.0	
Belgium	0		0.0	15	3.8	4.2
Denmark	0		0.0	3	0.8	0.8
Germany	0		0.0	5	1.3	1.4
Netherlands	0		0.0	5	1.3	1.4
United Kingdom	8		8.9	207	52.9	57.3
Ireland	56		62.2	29	7.4	8.0
France	3		3.3	45	11.5	12.5
Spain	7		7.8	47	12.0	13.0
Portugal/Azores	16		17.8	5	1.3	1.4

The quality and quantity of information provided for each site varies greatly. Although some reefs and banks are well investigated, very little information (in particular biological information) is recorded for vast areas. This is also reflected in the tentative categories assigned to the reefs. Only 20 % of the reefs in the reefs inventory had sufficient scientific information to determine them as reefs with certainty (WWF category a). Based only on the information contained in the UK Admirality Charts or in the United States Board of Geographic Names (1981) “Gazetteer of Undersea Features”, 56 % of all sites are listed as reefs in the reefs inventory, but no further detailed information on the substrate was found in the scientific literature (WWF category b). For 21 % there is no exact knowledge but it is highly likely that they have a reef-like structure (WWF category c). These latter sites are often situated close to relatively well researched sites.

A comparison was undertaken for sites that have been identified as both a “reef” in the reefs inventory and a “submerged sandbank” in the ESSB (Tab. 4.2).The presence of corals was taken as an indication of a reef site, even if present in only part of the site. It is likely that for some sites neither habitat is mutually exclusive.

This account of undersea features is only a first step to identify offshore sites for potential inclusion in the Natura 2000 network. However, the information does illustrate the vast number of sites that require consideration throughout EU waters.

Tab. 4.2: Sites listed as both "reefs" in the reefs database (Vol. IV) and as “submerged sandbank” in the European Submerged Sandbanks Database (ESSB, Vol. V): Comparison of information (WWF).
** in the maps these banks are in Faroese waters*

Sandbanks report				Reefs Report				WWF
ID	**Name**	**Jur.**	**Sediments**	**ID**	**Name**	**Jur.**	**Fauna**	**judgement**
113	Bergen Bank	UK	fine sand	22	Viking Bank	Norway	n.f.	sandbank
135	n.n.	UK	sand, mud	40	Darwin Mounds East	UK	Xenoph., corals	reef
136	n.n.	UK	sand	39	Darwin Mounds West	UK	Xenoph., corals	reef
137	Faeroe Bank	UK/ FAR*	sand, shell, rock, pebbles	21	Faeroe Bank	Faeroe*	sponges, corals	reef
141	Rosemary bank	UK	gravel, sand	29	Rosemary Bank	UK	corals but few info	reef
144	Bill Bailey's Bank	UK*	sand, shells	27	Bill Bailey Bank	UK*	corals but few info	reef
145	Outer Bailey or Lousy Bank	UK*	sand, shells, stones	28	Lousy Bank	UK*	corals but few info	reef
146	George Bligh Bank	UK*	sand, clay, mud	30	George Bligh Bank	UK*	corals but few info	reef
148	Rockall Bank	UK	sand, fine sand, gravel	41	Rockall Plateau / Rockall Bank	UK/ Ireland	coral reefs	reef
149	Empress of Britain Bank	UK	fine sand	42	SE Bank of Rockall Bank	UK/ Ireland	coral reefs	reef
175	Porcupine Bank	Ireland	coarse and fine sand	44-46	NW Flank of Porcupine Bank	Ireland	coral reefs	reef
176	n.n.	UK	sand, mud	47-73, 74	Reefs 1-74 Northern Porcupine Seabight	Ireland	coral reefs	reef
367	n.n.	Spain		109	Galicia Shelf East	Spain	sponges, corals	reef
373	Galicia Bank	E/P	sand, mud	111	Galicia Bank	Spain	corals, gorgonians	reef
374	Gettysberg or Gorringe Bank	E/P	sand, mud	177, 180	Gorringe Seamount	Portug.	corals, gorgonians	reef